THE SOUTH AFRICAN MUSEUM'S *MEIRING NAUDE* CRUISES

PART 13

BRYOZOA II

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(With 33 figures, 5 tables and 2 appendices)

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ABSTRACT

The bryozoan benthos of the shallow continental shelf seas off the eastern South African coast is rich in species, and taxonomically diverse. Samples from 18 stations established by the R.V. *Meiring Naude* between 1977 and 1979 have yielded a total of 38 anascan Cheilostomata, 76 ascophoran Cheilostomata and 16 Cyclostomata. The majority of the species were collected in depths of less than 100 m. Forty-four new species are described in the following genera: *Amphiblestrum*, *Copidozoum*, *Chaperia*, *Arachnopusia*, *Micropora*, *Macropora*, *Aspidostoma*, *Bugulella*, *Beania*, *Cribrilaria*, *Smittina*, *Smittoidea*, *Parasmittina*, *Escharella*, *Mucropetraliella*, *Cleidochasma*, *Hippoporella*, *Emballotheca*, *Fenestrulina*, *Gigantopora*, *Adeonella*, *Sertella*, *Iodictyum*, *Rhynchozoon*, *Brodiella*, *Turbicellepora*, *Hornera*. Additionally, *Dactylostega* gen. nov. is introduced for several species within the Hiantoporidae.

The South African bryozoan fauna includes a high proportion of endemic species, but also exhibits a marked faunal affinity with the Indo-West-Pacific region. The antiquity of this link is suggested by a number of similarities with the Tertiary fossil faunas of Australia and New Zealand.

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INTRODUCTION

The first report on the Bryozoa collected by the South African Museum's *Meiring Naude* cruises (Hayward & Cook 1979) described a fauna of 51 species from a series of stations on the outer continental shelf and the continental slope of eastern South Africa. These stations ranged in depth from 376 to 1 300 m, with most of them being deeper than 500 m. A preponderance of the species was shown to comprise specialized forms adapted to life on fine-grained, unstable sediments, although a number of species were more characteristic of hard-ground benthos and were considered to have been collected at the lower limits of their bathymetric ranges. A remarkable proportion of the fauna, 23 species, was new to science and, of the remainder, 14 were new records for South Africa. The present report describes the bryozoan material collected during the *Meiring Naude* cruises of 1977, 1978, and 1979, together with an additional sample from the 1976 cruise, and provides a useful supplement to the first survey in supplying data for the inner shelf areas of the same region. Thus, of the 18 samples studied here, 8 were collected in depths of less than 100 m, 1 was collected at 150–200 m, and 6 at less than 700 m. The samples contained abundant bryozoan material and, in contrast to the first collection, which included many widely distributed deep-sea species, were expected to provide a clearer picture of the indigenous South African fauna. These expectations were exceeded when study of the collections revealed 130 species, including an astonishing total of 44 new species, many of which seem to be endemic to this area of the south-western Indian Ocean. It is now apparent that the bryozoan fauna of South Africa comprises a rich and taxonomically diverse assemblage of species, and that the few previous studies on this region (see Day *et al.* 1970) have failed to reveal more than a fraction of its potential complexity.

The bottom sediments at a number of the stations studied here included a substantial fraction of bryozoan remains. These fragments included numerous unrecognized species of Cheilostomata and Cyclostomata that could be neither identified with any of the species described here nor adequately characterized from the material available. This report, therefore, cannot be regarded as a complete survey of the shallow component of the South African bryozoan benthos. Further collections will, without doubt, produce a yet greater range of undescribed or poorly known species and genera. Many of the previously described species reported here for the first time from South African waters are known to be widely distributed in the Indo-West-Pacific region. Several of the new species have systematic affinities with Tertiary fossil forms of Australia and New Zealand. The potential of further research in this region for marine zoogeographical theory seems exciting.

LIST OF SPECIES

The present collections comprised 130 species of Bryozoa: 38 anascan Cheilostomata, 76 ascophoran Cheilostomata and 16 Cyclostomata. Ctenostomata were not found. In Tables 1–3 the species are listed in systematic order and their occurrence at each of the eighteen stations is given. The stations are arranged in order of increasing depth and the notation distinguishes between live and dead records. Co-ordinates and depths for each of the stations studied are given in Appendix 1. Data for all stations have been published by Louw (1977, 1980).

TABLE 1

Anascan Cheilostomata. The species are listed in systematic order, stations in order of increasing depth. New species are indicated by an asterisk (*). × = represented by living colonies. † = dead colonies only.

Depth station	179	180	184	163	163/164	164	185	100 m ↓239	250	500 m ↓234	233	232	162	103	700 m ↓123	131	129	151
Carbasea mediocris								×	×		×							
Cupuladria multispinata	†	†					†						†					
Discoporella umbellata	×	×	†		†		†						†			†		
Setosellina roulei						†								†		†		
Heliodoma implicata														×	×	†		
Callopora sp.				†	†	†	†											
Amphiblestrum inermis			×	×		†	×											
**Amphiblestrum pontifex*								×										
**Copidozoum transversum*								×	×									
Crassimarginatella marginalis				×	†	†		×	×									
Foveolaria imbricata	×	†	†	†	†		×									†	†	†
Foveolaria sp.													†					
Chaperia multifida	×	†	†	†	†		×											
Chaperia capensis	×	†			×													
Chaperia stephensoni			†	†														
**Chaperia familiaris*		×		×									×					
Chaperia sp.		†	†	†	†		†											
Notocoryne cervicornis		†	†	†	†		†											†
**Dactylostega prima*	×	×	×	×	×	×	×						×			†		
**Arachnopusia corniculata*					×	×			×							†		
**Micropora similis*		†		×	×	×		×	×		†							
Steginoporella buskii				†	×	×										†		
**Macropora africana*			×	×	×		†											
Cellaria tectiformis										×	×			†		†		†
Cellaria punctata		†			×	×												
Cellaria paradoxa														†				
**Aspidostoma livida*			†			†		×								†		
Caberea darwinii	×		×		×		×	×										
Eupaxia quadrata												×						
Menipea crispa	×				×	×												
Menipea triseriata	×	×		×		×	×											
Menipea ornata							×											
Menipea marionensis	×	×					×											
Bugulella australis											×							
**Bugulella problematica*											×							
Beania magellanica	×			×				×										
**Beania rediviva*									×									
Bugula dentata		×																
Species per station	11	14	11	15	16	12	14	8	6	1	5	1	5	4	1	9	1	3

TABLE 2

Ascophoran Cheilostomata. The species are listed in systematic order, stations in order of increasing depth. New species are indicated by an asterisk (*). × = represented by living colonies. † = dead colonies only.

Depth station	179	180	184	163	163/164	164	185	100 m ↓239	500 m ↓250	↓234	233	232	162	103	700 m ↓123	131	129	151
Cribrilaria innominata				×	×													
Cribrilaria venusta								×										
**Cribrilaria africana*				×		×			×									
Figularia philomela				×														
Figularia sp.				×														
Escharoides contorta		†	×	×	×	×	×	×					†					†
**Dimorphocella moderna*	†	†				†	†	×	†									
Exechonella sp.						†	†		†									
Pachycleithonia mutabilis																†	†	
Tropidozoum burrowsi																†		†
**Smittina sitella*				†	†		†	×										
**Smittina ferruginea*								×										
**Smittoidea circumspecta*			×	×			×	×										
**Smittoidea errata*					×			×										
**Smittoidea calcarata*											×							
Parasmittina tropica			×	×	†	†	†	×										
**Parasmittina novella*								×										
Porella capensis				†		×		×										
**Escharella discors*					†													
**Mucropetraliella asymmetrica*	†	†		†		×	†	×										
Arthropoma cecilii							×											
Arthropoma circinatum				†														
Arthropoma sp.				×			×											
Escharina pesanseris									×									
Escharina waiparaensis						×		×										
Calyptotheca nivea	×			×	†	×	×					×						
Calyptotheca porelliformis				×			×											
**Emballotheca ambigua*									×									
Stomachetosella balani							×											
Cleidochasma porcellanum				×														
Cleidochasma protrusum																†		
Cleidochasma cribritheca				×	×	×												
**Cleidochasma perspicua*				×														
Hippoporidra senegambiensis							×											
Hippoporella spinigera				×		×			×							†		†
**Hippoporella labiata*									×									
Hippomenella avicularis				†												†		
Microporella sp.					†			×										
Flustramorpha flabellaris	×	†																
Flustramorpha marginata			†		†		×	×										
Flustramorpha angusta			×	×	×		×									†		
**Fenestrulina indigena*				×	×													
Trypostega venusta				×	×	×		×										
Gigantopora polymorpha	×	†					×											
**Gigantopora foraminosa*			†	×	×	†										†		
Adeonella majuscula											×							
Adeonella cracens														†				
**Adeonella decipiens*	†	†	†	×	×		×									†		
**Adeonella confusanea*	×			†	×		×											
**Adeonella conspicua*	×																	
**Adeonella distincta*							×											
**Adeonella infirmata*								×										
**Adeonella abdita*				×	×	×	×	×										
**Adeonella gibba*	×	†		×	×		×											

Table 2 continued on next page.

Depth station	179	180	184	163	163/ 164	164	185	100 m ↓ 239	250	500 m ↓ 234	233	232	162	103	123	700 m ↓ 131	129	151
**Adeonella alia*	×																	
Tessaradoma bispiramina										×	×			†				†
Tessaradoma circella											×			†				
Sertella lata	×			×			×											
**Sertella verecunda*							×											
Schizoretepora tessellata		†		†	†		×											
Reteporella dinotorhynchus			†	†	†		×											
**Iodictyum flosculum*				†		×	×											
**Rhynchozoon documentum*				×	×	×												
**Rhynchozoon beatulum*			×	×	×		×											
**Rhynchozoon incallidum*		†	×	×	×		×											
**Rhynchozoon oscitans*		†					×											
**Rhynchozoon stomachosum*										×								
**Rhynchozoon ptarmicum*	×						×	×	×									
Brodiella longispinata							×	×										
**Brodiella ignota*									×									
Turbicellepora conica	×	†	†	†	†	×	×											
**Turbicellepora valligera*				×				×										
Celleporaria tridenticulata				†	†	†							†					
Celleporaria capensis		†		†	†		†											
Vittaticella sp.							×											
Anoteropora latirostris					×		×											
Species per station	13	12	11	38	27	18	35	20	9	2	4	1	2	3	0	8	1	4

TABLE 3

Cyclostomata. The species are listed in systematic order, stations in order of increasing depth. New species are indicated by an asterisk (*). × = represented by living colonies. † = dead colonies only.

Depth station	179	180	184	163	163/ 164	164	185	100 m ↓ 239	250	500 m ↓ 234	233	232	162	103	123	700 m ↓ 131	129	151
Diaperoecia				×														
Mecynoecia clavaeformis					×											×		
Mecynoecia delicatula					×		×										†	
Mecynoecia australis		†			×		×										†	†
Plagioecia patina					×													
Liripora lineata					×		×											
Idmidronea contorta					†		†									†	†	
Idmidronea crassimargo					×		×											
Idmidronea cf. *parvula*					†		†											
Idmidronea cf. *biporata*					†		†											
Idmidronea cf. *antarctica*					†											†	†	
Idmidronea cf. *atlantica*					†												†	
Crisia elongata					×										×			
Lichenopora novae-zealandiae			×		×		×									†		
Crisina radians																†		
**Hornera erugata*				†														
Species per station	0	1	1	2	13	0	8	0	0	0	0	0	0	0	1	5	5	1

SYSTEMATIC ACCOUNT

ORDER CHEILOSTOMATA

Family **Flustridae** d'Orbigny, 1852

Flustridae d'Orbigny, 1852: 324. Smitt, 1868: 357. Ryland & Hayward, 1977: 76.

Carbasea Gray, 1848

Carbasea Gray, 1848: 105, 146. Ryland & Hayward, 1977: 79.

Carbasea mediocris Hayward & Cook, 1979

Fig. 1A–B

Carbasea mediocris Hayward & Cook, 1979: 52, fig. 2A–B.

Material

Stations SM 233, SM 239, SM 250.

Remarks

The present material allows a more complete description of this species. Live colonies were obtained from each of the three stations and together include all astogenetic and ontogenetic stages. The specimens were up to 55 mm in length, the slender fronds dividing dichotomously at regular intervals; there were six to eight longitudinal series of zooids. The ancestrula (Fig. 1B) was slender and elongate and, including its tubular proximal extension, exceeded 3 mm in length. The basal portion of the colony presents a most curious appearance, with short cylindrical rhizoids projecting at right angles from the lateral borders of the ancestrula and the lowest zooids of the colony, before flexing abruptly and descending in flat fused bundles to the substratum. Most of the specimens were brooding embryos; the ovicells, partially immersed in the zooids distal to the maternal zooids, were up to 0,46 mm long and equally broad, thinly calcified with a faintly striated surface.

The holotype was collected from 550 m depth (Hayward & Cook 1979), the present material was obtained at depths of 90 m to 580 m.

Family **Cupuladriidae** Lagaaij, 1952

Cupuladriidae Lagaaij, 1952: 31. Cook, 1965*a*: 154; 1965*b*: 192.

Cupuladria Canu & Bassler, 1919

Cupuladria Canu & Bassler, 1919: 77. Lagaaij, 1952: 32. Cook, 1965*b*: 197.

Cupuladria multispinata (Canu & Bassler, 1923)

Cupularia multispinata Canu & Bassler, 1923: 78, fig. 13H.
Cupuladria multispinata: Cook, 1965*b*: 210, pl. 2 (fig. 2A–B), fig. 2d.

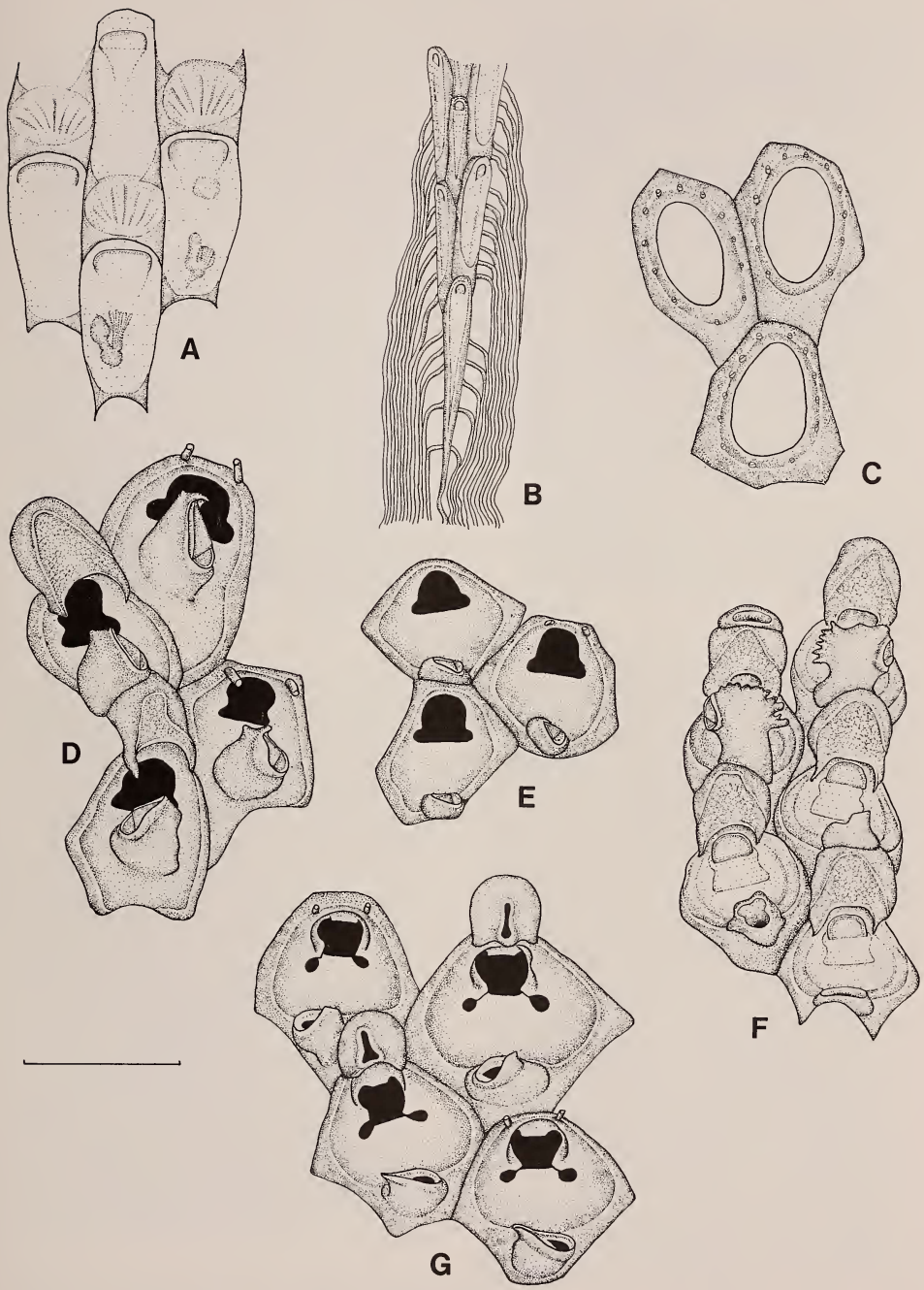

Fig. 1 A–B. *Carbasea mediocris* Hayward & Cook. A. Ovicelled zooids. B. The ancestrula, and basal attachment rhizoids. C. *Callopora* sp. D–F. *Amphiblestrum inermis* (Kluge). D. A group of zooids with large avicularia, including two with characteristic ovicells. E. Zooids from a juvenile colony, with small avicularia. F. Ovicelled zooids, two with distinctive avicularia. G. *Amphiblestrum pontifex* sp. nov. Scale = 0,5 mm for C–G; 1 mm for A–B.

Material

Stations SM 162, SM 179, SM 180, SM 185.

Description

Cupuladria with large zooids (Lz 0,55–0,76 mm). Colonies with coarsely tuberculate, alternating, radiating ridges basally. Zooids with well-developed lateral cryptocyst denticles that end in fine spinules.

Remarks

All the colonies found were dead and worn; they were almost certainly transported. *C. multispinata* differs from *C. owenii* (Gray), which also occurs in South African waters (Cook 1965*b*: 213), in its larger colonies and larger zooids. The denticulation on the edge of the cryptocyst and the basal tuberculations are also coarser than in *C. owenii*.

Distribution

North-west, west, and south-east Africa, 7–105 m.

Discoporella d'Orbigny, 1852

Discoporella d'Orbigny, 1852: 472. Cook, 1965*b*: 219.

Discoporella umbellata (Defrance, 1823)

Fig. 2

Lunulites umbellata Defrance, 1823: 361, pl. 47 (fig. 1a–b).
Discoporella umbellata: Cook, 1965*a*: 177, pl. 1 (fig. 7), pl. 3. (figs 1, 3, 5–6), fig. 4; 1965*b*: 221, pl. 3 (fig. 3), fig. 2h. Hayward & Cook, 1979: 44.

Material

Stations SM 131, SM 162, SM 163/164, SM 179, SM 180, SM 184, SM 185.

Description

Zooids with complete cryptocyst lamina, pierced by several pairs of opesiules, and other foramina. Opesia D-shaped, straight proximally. Basal surface with irregular pores or pits, becoming flat and smooth. At colony maturity a layer of kenozooids alternating with avicularia grows from the periphery and spreads over the basal surface, which is usually by then flat, not curved.

Remarks

Most populations of *D. umbellata* do not show the basal changes that occur in these specimens. This morphotype was described as '*D. umbellata peyroti*-type' by Cook (1965*a*: 179), because a similar form of colony growth

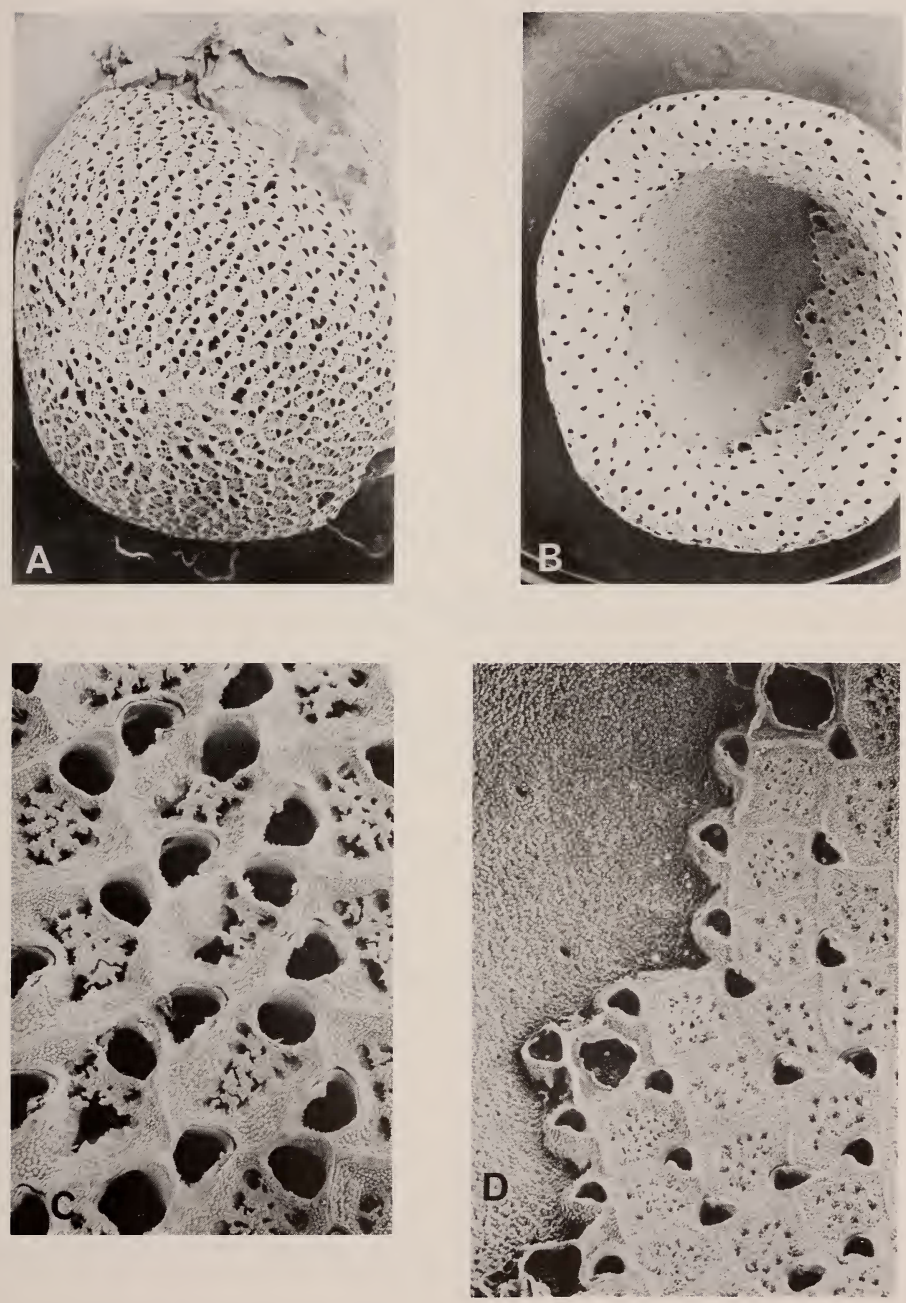

Fig. 2. *Discoporella umbellata* (Defrance). A. Frontal view of a colony. × 9,3. B. Basal view showing the ingrowing layer of kenozooids and avicularia. × 9,3. C. Enlarged frontal view of autozooids. × 61. D. Enlarged view of basal lamina. × 26.

was first described as *Cupularia peyroti* from the European Tertiary. The cause of the progressive infilling of the concave basal surface in these colonies is unknown, but may be similar to that which produces infilling in many colonies of *C. doma* (see Cook 1965*b*: 216). The development of a basal layer of kenozooids and avicularia, however, seems to occur only in Recent populations of *D. umbellata* from South Africa. One of the functions of the basal avicularia appeared to be to discourage the settlement of larvae of sponges, serpulid worms and other bryozoans, all of which are often found occupying the basal concavity in other populations of *D. umbellata*, and in other species of the Cupuladriidae (see Cook 1965*b*: 195). Very young dead colonies were present at nearly all stations, but living colonies with avicularian setae intact were collected only at Stations SM 179 and SM 180.

Distribution

The *D. umbellata* species complex has a wide distribution in tropical and subtropical regions of the Atlantic Ocean and the western Indian Ocean, but '*peyroti*-type' colonies are known only from South Africa.

Family **Setosellinidae** Hayward & Cook, 1979

Setosellinidae Hayward & Cook, 1979: 45.

The family was introduced for genera with free-living colonies of spirally-budded zooids supported by long setiform avicularian mandibles. The zooidal opesia is extensive, and large ovicells are present.

Setosellina Calvet, 1906

Setosellina Calvet, 1906: 157. Hayward & Cook, 1979: 48.

Setosellina roulei Calvet, 1906

Setosellina roulei Calvet, 1906: 157; 1907: 395, pl. 26 (figs 5–6). Hayward & Cook, 1979: 48, figs 1A, 17B, 18B.

Material

Stations SM 103, SM 131, SM 164.

Remarks

In contrast to the large number of specimens previously reported (Hayward & Cook 1979), a very few 'dead' colonies were found in the present collections.

Heliodoma Calvet, 1906

Heliodoma Calvet, 1906: 157. Hayward & Cook, 1979: 50.

Heliodoma implicata Calvet, 1906

Heliodoma implicata Calvet, 1906: 157; 1907: 396, pl. 26 (figs 7–9). Hayward & Cook, 1979: 50, figs 17A, 18A.

Material

Stations SM 103, SM 123, SM 131.

Remarks

Some of the specimens from stations SM 103 and SM 123 were alive when collected; only those from SM 103, which have been reported before (Hayward & Cook 1979) were numerous.

Family **Calloporidae** Norman, 1903

Calloporidae Norman, 1903: 587. Ryland & Hayward, 1977: 87.

Callopora Gray, 1848

Callopora Gray, 1848: 109, 146. Ryland & Hayward, 1977: 87.

Callopora sp.

Fig. 1C

Material

Stations SM 163, SM 163/164, SM 164, SM 185.

Description

Colony encrusting. Zooids 0,5–0,7 mm long by about 0,4 mm broad. Opesia oval, cryptocyst narrow; gymnocyst smooth, of variable extent. Spines distributed around whole of opesia, up to ?12 in number. No sessile avicularia. Ovicell small, hyperstomial, perhaps with frontal area.

Remarks

Colonies of an unrecognized species of *Callopora* were found at each of the above stations. All were dead, and damaged to a greater or lesser extent. Although it appears to be undescribed, the poor state of the material precludes the possibility of an adequate taxonomic description and, accordingly, the species must remain unnamed until further specimens are collected.

Amphiblestrum Gray, 1848

Amphiblestrum Gray, 1848: 103. Ryland & Hayward, 1977: 103.

Amphiblestrum inermis (Kluge, 1914)

Fig. 1D–F

Membranipora inermis Kluge, 1914: 663, pl. 34 (fig. 6).
Lepralia triangularis O'Donoghue, 1924: 43, pl. 2 (figs 11– 12).
Amphiblestrum triangulare: O'Donoghue, 1957: 74.

Material

Stations SM 163, SM 164, SM 184, SM 185.

Description

Colony encrusting, unilaminar. Zooids flat, hexagonal or irregularly polygonal, separated by shallow grooves; 0,4–0,5 mm long by 0,36–0,4 mm broad. Cryptocyst flat, occupying half length of zooid, surrounded by a thin crenellated rim; two widely spaced, evanescent spines distally; opesia trifoliate, proportions variable, most frequently with proximal portion constituting one-third or less of total length. Gymnocyst smooth, largely obscured by a single adventitious avicularium, orientated transversely and acute to frontal plane. Rostrum hooked, supporting an acute triangular mandible. Ovicell prominent, recumbent on succeeding zooid, with a large triangular area of uncovered granular, entooecium frontally; raised border between entooecium and ectooecium produced at proximolateral corners of ovicell to form projecting, proximally directed spikes. Within the colony the size of the avicularian cystid varies astogenetically and the proportions of the opesia vary ontogenetically.

Remarks

O'Donoghue (1924) noted that his *L. triangularis* seemed similar to the Antarctic *Membranipora inermis* Kluge. The type specimen (BMNH 1963.3.20.7.) is poor, consisting of fragments of several young colonies; there are no ovicells and most of the zooids lack avicularia. A second specimen from Saldanha Bay (BMNH 1936.12.30.281) is equally fragmentary, but the zooids possess avicularia. It is difficult, therefore, to identify O'Donoghue's material with *M. inermis* Kluge. Good examples of the latter species are known from South Africa, viz. from False Bay (BMNH 1962.6.4.6.), and from Simon's Bay (BMNH 1944.1.8.186); both are well-grown colonies with prominent avicularia, and the False Bay specimen has numerous ovicells showing the triangular, granular frontal area, and proximolateral processes, characteristic of Kluge's species. Unfortunately neither includes early astogenetic stages and it is not possible to judge whether the fragmentary specimens of O'Donoghue represent simply early astogenetic stages of *M. inermis*.

The *Meiring Naude* material provides some evidence for this supposition, but the number of specimens is small and additionally suggests an even broader range of variation. The material described above (station SM 184, Fig. 1D) is without doubt closest to Kluge's species, and includes some early zooids with

very small frontal avicularia. A specimen from station SM 163 (Fig. 1E), small and lacking ovicells, has very small avicularia and the zooids resemble closely both the early astogenetic stages of the colony from SM 184 and O'Donoghue's type specimen of *L. triangularis*. In a specimen from station SM 185 (Fig. 1F) the free distal edge of the avicularian cystid is flattened and expanded, forming a structure similar to that seen in species of *Foveolaria*; however, the ovicell, the paired spines, the opesia, and the avicularian rostrum are identical to those of the material described (SM 184).

Amphiblestrum pontifex sp. nov.

Fig. 1G

Material

Holotype: SAM–A26413, station SM 239, 32°14,8′S 29°00,8′E, 90 m.

Description

Colony encrusting. Zooids oval, broad and flat, distinct, separated by deep grooves. Gymnocyst reduced but visible, continuous laterally with incurved lateral walls, smooth and hyaline. Cryptocyst extensive, comprising four-fifths of total zooid length, flat and smooth, encircled by a raised and thickened mural rim. Opesia subterminal, less than half length of cryptocyst, and distally less than half its width; shape characteristic, opesiular indentations small, initially continuous with distal part of opesia, but later isolated from it. Two widely spaced distal oral spines present in newly developed zooids, later lost. Avicularium medially situated on gymnocyst, orientated transversely; cystid globose, rostrum elongate, acute-triangular, its distal end curved to left or right. Ovicell prominent, spherical, small; smooth surfaced, with a longitudinal median ridge marking the thickened edges of a narrow frontal foramen.

Etymology

Pontifex (L.)—high priest, an allusion to the shape of the opesia.

Remarks

A. pontifex may be distinguished from other species of *Amphiblestrum* by the form of the opesia, in particular by the isolation of the opesiular indentations. Several live colonies encrusting the large specimen of *Dimorphocella* were collected.

Measurements (means of 20 values) in mm

Lz	lz
0,57	0,48

Copidozoum Harmer, 1926

Copidozoum Harmer, 1926: 226.

Copidozoum transversum sp. nov.

Fig. 3A

Material

Holotype: SAM–A26414, station SM 239, 32°14,8′S 29°00,8′E, 90 m.
Other material: station SM 250.

Description

Colony encrusting. Zooids oval, large. Frontal surface almost entirely membranous: gymnocyst apparent as a small triangular area of calcification on zooids at a row bifurcation; cryptocyst forming simply a narrow granulated border, mural rim thin, no spines. Vicarious avicularia conspicuous, cystid tumid; rostrum orientated transversely, 0,24–0,34 mm long, distal portion slender, with a blunt tip, proximal portion rounded, opesia oval, with a granular cryptocyst, mandible articulating against paired, thickened condyles. Ovicells not found.

Etymology

Tranversus (L.)—crosswise, referring to the orientation of the avicularium.

Remarks

Living colonies were collected from both the above stations.

Measurements (means of 20 values) in mm

Lz	lz
0,64	0,42

Crassimarginatella Canu, 1900

Crassimarginatella Canu, 1900: 369. Hastings, 1945: 69.

Crassimarginatella marginalis (Kirkpatrick, 1888)

Fig. 3B

Membranipora marginalis Kirkpatrick, 1888: 74, pl. 7 (fig. 2).
Crassimarginatella marginalis: Hastings, 1945: 78, fig. 2B.

Material

Stations: SM 163, SM 163/164, SM 164, SM 239, SM 250.

Remarks

In the size of the zooids, the relatively broad cryptocyst, and the morphology of the vicarious avicularia, the *Meiring Naude* specimens closely resemble the Mauritian type specimen of *C. marginalis* (BMNH 1888.12.5.8.). The *Meiring Naude* specimens tend to be more thickly calcified, but as no live

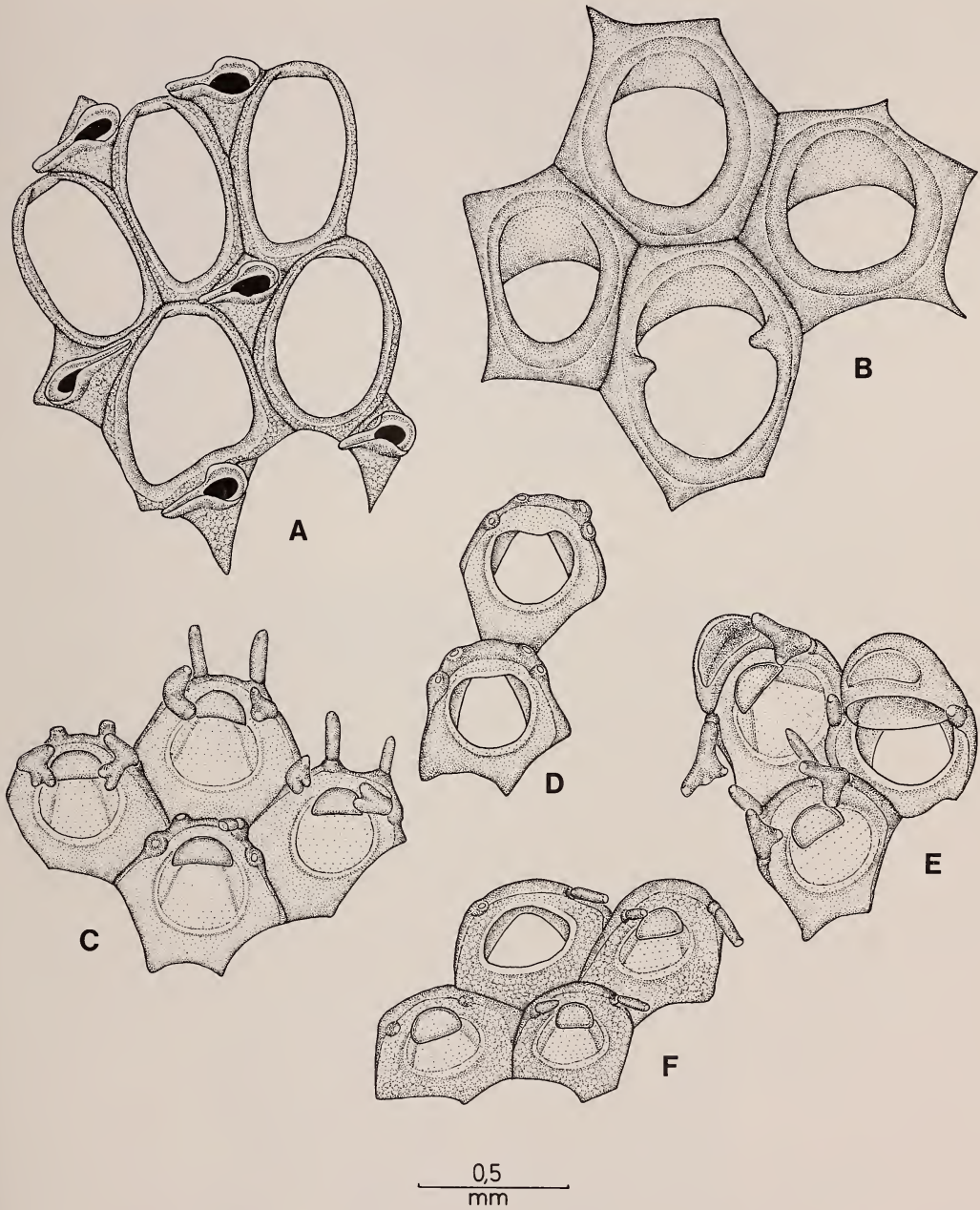

Fig. 3. A. *Copidozoum transversum* sp. nov. B. *Crassimarginatella marginalis* (Kirkpatrick). C–E. *Chaperia familiaris* sp. nov. C. Zooids from a live collected colony, showing the forked proximal spines. D. Two dead zooids, showing the extent of the occlusor laminae. E. A group of zooids with ovicells in different stages of development. F. *Chaperia capensis* (Busk).

juvenile colonies were collected, the majority of the material representing dead colonies, this may be regarded as an ontogenetic effect.

Foveolaria Busk, 1884

Foveolaria Busk, 1884: 68. Harmer, 1926: 246.

Foveolaria imbricata (Busk, 1884)

Fig. 4

Amphiblestrum imbricatum Busk, 1884: 65, pl. 15 (fig. 3).
Membranipora imbricata: Marcus, 1922: 16, fig. 9.

Material

Stations SM 129, SM 131, SM 151, SM 163, SM 163/164, SM 179, SM 180, SM 184, SM 185.

Description

Colony arising from an encrusting sheet of zooids, forming an erect cylindrical growth. Zooids in alternating linear series around the entire axis of the branch; broadly diamond-shaped, as wide as long, distal edge raised and distinctly crenellated. Frontal membrane underlain by a smooth, extensive cryptocyst, deeply concave; opesia subtriangular, occupying less than one-third of total zooid length. Frontal surface largely hidden by a tall, broad avicularium, developed on the proximal half of the cryptocyst; cystid cylindrical at first, broadened distally, with a thin irregular edge. Rostrum situated on the lateral face of the cystid, acute triangular, apically orientated, with stout condyles for articulation of the mandible. No spines. Ovicells not observed.

Remarks

Busk's original description of this species (1884: 65) is confusing. He considered he was viewing a unilaminar colony encrusting another, erect, bryozoan species, although his material is clearly an erect cylindrical colony. The relative proportions of gymnocyst and cryptocyst, the origin of the frontal avicularium, the nature of the ovicell and, perhaps, colony form are the features most likely to prove useful in distinguishing *Foveolaria* (as defined by Levinsen 1909: 152) from *Amphiblestrum* (above). At present *A. imbricata* Busk seems more correctly placed in *Foveolaria* than in *Amphiblestrum*.

Foveolaria sp.

Fig. 5A

Material

Station SM 162.

Description

Colony erect, cylindrical, slender. Zooids in triple whorls, elongate, rounded distally, tapered proximally; lateral walls flared distally, forming an

Fig. 4. *Foveolaria imbricata* (Busk). A. An entire colony. × 12. B. Detail to show the avicularia. × 82.

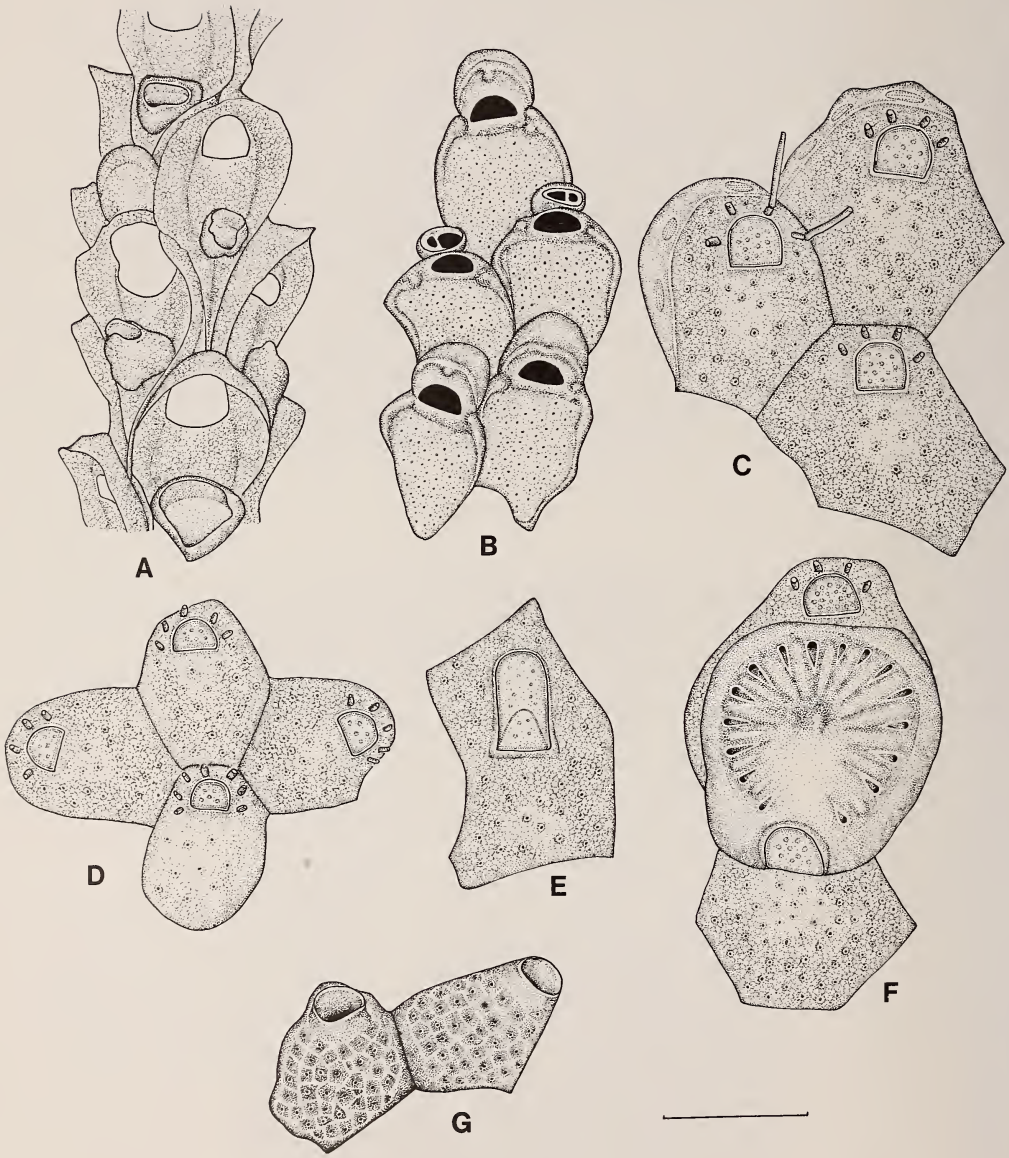

Fig. 5. A. *Foveolaria* sp., the dead specimen from SM 162. B. *Micropora similis* sp. nov. C–F. *Macropora africana* sp. nov. C. Zooids from the growing edge. D. The ancestrula, and periancestrular zooids. E. A vicarious avicularium. F. An ovicelled zooid. G. *Exechonella* sp. Scale = 0,5 mm for A–F; 1 mm for G.

arched hood. Cryptocyst extensive, flat, opesia comprising less than one-quarter of zooid length. A broad-based, possibly cylindrical, avicularian cystid present on the proximal region of the cryptocyst. Ovicell spherical. No spines.

Remarks

Dead fragments of an unrecognized species of *Foveolaria* were obtained from station SM 162. Unfortunately all of the features of the zooids were damaged to a greater or lesser extent, in particular the larger part of each avicularium was missing; the condition of the material thus precludes a complete description of the species.

Family **Chaperiidae** Jullien, 1888

Chaperiidae Jullien, 1888: 61. Brown, 1952: 94.

Chaperia Jullien, 1881

Chaperia Jullien, 1881: 163. Brown, 1952: 94. Gordon, 1982.

The genus *Chaperia* comprises a large number of species described from localities throughout the southern hemisphere. The synonymy of many of these species is confused to the extent that no useful comments may be made regarding systematic relationships or distributional patterns until the majority of described species has been critically re-examined. Brown (1952: 94) clarified the status of *Chaperia* Jullien, noting that the type species was the originally designated *C. australis* Jullien, 1881, and selected a neotype for *C. acanthina* (Lamouroux, 1825). Brown also indicated that *C. acanthina* may prove to be a senior synonym of *C. australis*, and it would seem useful to consider here whether this synonymy may be accepted.

Jullien (1881: 163) introduced *C. australis* as a new name for *Membranipora spinosa* Busk, 1879; Busk had referred his material (from Kerguelen) to *Flustra acanthina* (Lamouroux, 1825) but had derived the name from the non-Linnean 'Flustra épineuse' used by Lamouroux in the explanation of his plate (1825, Atlas, pl. 89, figs 1–2). Although Jullien (1881) was describing specimens of *C. australis* from South Africa, he was quite explicit in introducing the name for Busk's Kerguelen material, and the possible synonymy of *C. acanthina* and *C. australis* thus depends on the identity of Busk's specimens. Jullien's South African specimens pose another problem. Marcus (1922) described material from South Africa under the name *C. acanthina* var. *australis* Jullien, which is here referred to *C. capensis* (Busk) (q.v.). The South African material of *C. australis* may prove to be identical to Busk's Kerguelen specimens, or it may be identifiable with Marcus's material; only examination of Jullien's specimens will decide the issue, but its result is irrelevant to the identity of *C. australis*, which is determined solely by the Busk specimen from Kerguelen. Fortunately this is still extant (BMNH 1899.7.1.1155, 1156); it comprises a single, well-grown young colony encrusting a small rhodophyte.

Comparison with the neotype of *C. acanthina* (BMNH 1930.1.16.26A) and with other material from the Falkland Islands (BMNH 1935.3.6.59, 316) shows that Busk's specimen may be assigned confidently to *C. acanthina* (Lamouroux). The zooids of all four specimens are of a similar size (0,5–0,6 mm long by 0,4–0,5 mm broad) with a granular cryptocyst comprising two-fifths of the total length. The opesia is surrounded by jointed spines of variable thickness, up to 0,6 mm long; these number five or six on the Falkland Islands specimens, and six or seven in the Kerguelen colony. The occlusor laminae in all cases are distinct, slightly curved but not converging markedly towards the distal end of the zooid, the visible length being 0,2 mm.

It may be shown, therefore, that *C. australis* Jullien is a junior subjective synonym of *C. acanthina* (Lamouroux), which accordingly becomes the type species of *Chaperia* Jullien. The subsequent synonymy of *C. acanthina* is adequately provided by Brown (1952: 95); *C. acanthina* was also discussed by Harmer (1926: 229), but his material included the Siboga specimens from the tropical East Indies which appear to differ from Brown's neotype, most notably in possessing up to ten small spines. Finally, and inexplicably, Jullien (1888) figured specimens of a *Chaperia* from Cape Horn which he attributed to '*Flustra spinosa*', noting that it was the same as that to which he had in 1881 given the name *Chaperia australis*. His text, though brief, suggests that he had by then concluded that *C. acanthina* and *C. australis* were identical, but his use of the spurious '*Flustra spinosa*' perhaps served to obscure his opinion.

Chaperia multifida (Busk, 1884)

Fig. 6

Membranipora galeata var. *multifida* Busk, 1884: 64.
Chaperia multifida: Kluge, 1914: 673, text-fig. 44. Marcus, 1922: 7, fig. 3.
Membranipora galeata var. *multifida:* O'Donoghue & De Watteville, 1935: 205.

Material

Stations SM 163, SM 163/164, SM 179, SM 180, SM 184, SM 185.

Description

Colony encrusting, forming patches or cylindrical growths around erect substrata; developing as erect bilaminar sheets or solid branching cylinders. Zooids hexagonal or irregularly oval, separated by indistinct sutures, 0,44–0,65 mm long by 0,26–0,4 mm broad. Cryptocyst forming a narrow, finely granular, concave rim, most prominent proximally and tapering rapidly towards spine bases. Opesia circular or oval, marginally longer than wide in the larger zooids, occupying three-fifths to three-quarters of total frontal length. Occlusor laminae distinct, quite divergent distally; arising on each side from a point below the distal spine and extending to half-way along the lateral margin of the opesia. Two pairs of distolateral spines, thick, jointed at base with a distinct coelomic cavity; proximalmost pair broadening rapidly, developed as multi-branched palmate structures arching over and obscuring most of the frontal

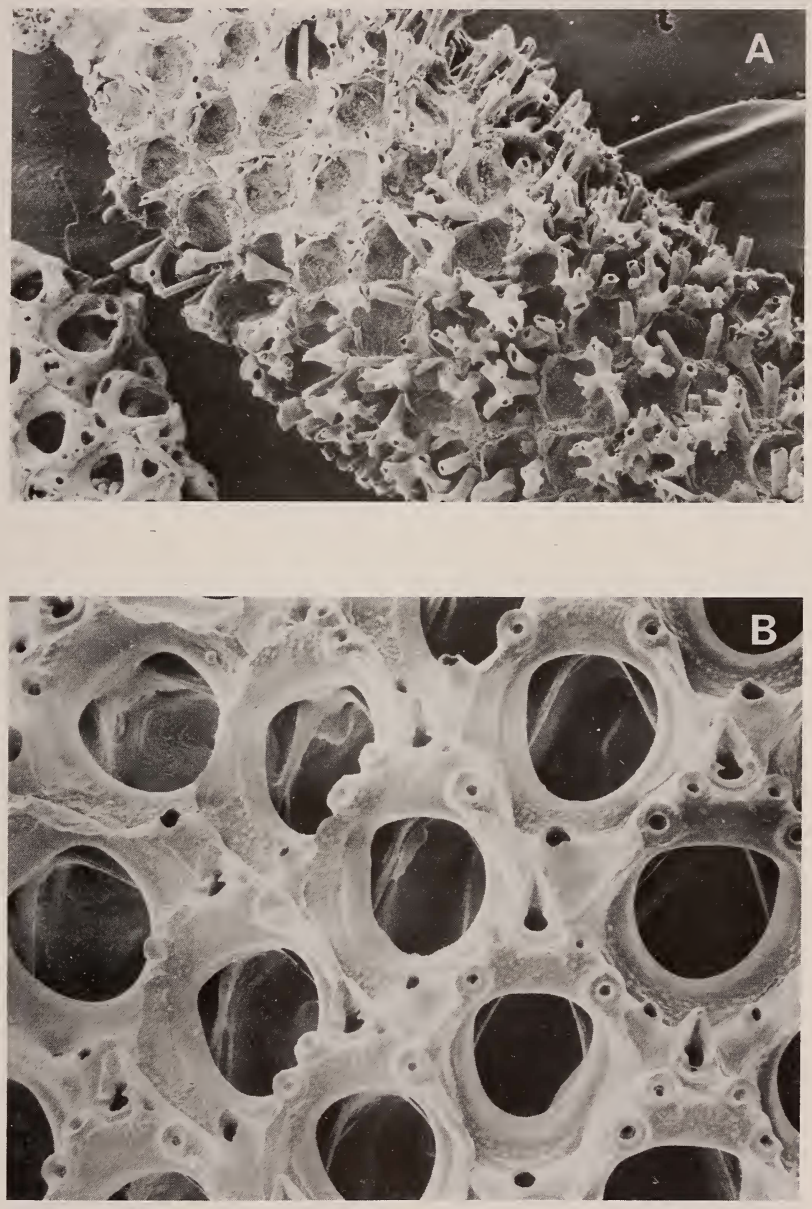

Fig. 6. *Chaperia multifida* (Busk). A. Portion of a live collected colony (on right) with spines and pedunculate avicularia intact, and a dead fragment for comparison (on left). × 29. B. Bleached fragment of a live collected colony. × 79.

surface of the zooid. Distalmost pair of spines typically erect, cylindrical, clavate or spatulate, rarely palmate. A single sessile avicularium at the distal end of each zooid, situated between the distalmost pair of spines; rostrum triangular, distally orientated, with an incomplete cross-bar and a transversely oval foramen in the palate; rarely, the rostrum may be broadened to give a narrowly spatulate shape. Erect, elongate pedunculate avicularia numerous, most frequently situated adjacent to the sessile avicularium on one or both sides; sometimes developed between adjacent zooids, arising from the lateral wall of one of them; one or more of the distal spines may also be replaced by pedunculate avicularia. Ovicell prominent, hemispherical, with an oval or irregular frontal area; in fertile zooids the distal pair of spines and the avicularia are suppressed.

Remarks

The material from SM 179 and SM 185 comprised living colonies retaining a reddish coloration in alcohol and forming cylindrical growths around hydroid stems. All the material from the other stations consisted of dead fragments; some of these were encrusting, unilaminar patches and some bilaminar sheets, but the majority were fragments of cylindrical or flattened branching colonies up to 10 mm high. Bleached zooids from SM 179, lacking spines and pedunculate avicularia are compared with those of a dead cylindrical fragment in Figures 6A–B, and it may be seen that, despite the variation in colony morphology, only one species is represented.

Chaperia capensis (Busk, 1884)

Fig. 3F

Amphiblestrum capense Busk, 1884: 67, pl. 23 (fig. 3).
Chaperia acanthina var. *australis:* Marcus, 1922: 6, fig. 2.
Membranipora galeata var. *inermis* O'Donoghue, 1924: 38, pl. 1 (fig. 9).
Chapperia acanthina var. *australis:* O'Donoghue & De Watteville, 1944: 415.

Material

Stations SM 163/164, SM 179, SM 180.

Description

Colony encrusting, forming cylindrical growths around erect substrata, developing as erect, solid cylindrical structures, branching irregularly. Zooids broad and flat, typically hexagonal, broader than long, separated by shallow grooves; 0,5–0,6 mm long by about 0,6 mm broad. Cryptocyst finely granular, concave, broadest proximally, narrowing towards the distal end. Opesia transversely oval, occupying about three-fifths of total frontal length; occlusor laminae well developed and distinct, seen to converge distally even in unbleached undamaged material, extending lateroproximally almost to the proximal edge of the opesia. One short cylindrical spine present at each distal

corner, variable in length but typically no longer than the width of the opesia. Avicularia and ovicells absent.

Remarks

The proportions of the zooids seem to vary according to the form of growth of the colony; in regular cylindrical branches they tend to be longer than broad, but may broaden considerably in encrusting sheets or irregular branches. The type material from Simon's Bay, South Africa consists of several solid cylinders lacking bases. The specimens from *Meiring Naude* stations SM 163/164 and SM 179 form hollow cylinders around hydroids; dead fragments from SM 180 consisted mostly of solid cylinders, but some included a hollow, encrusting cylindrical base.

The material described and figured by Marcus (1922: 6, fig. 2) as *C. acanthina* var. *australis* clearly belongs in the synonymy of *Chaperia capensis*; however, as discussed above, the identity of Jullien's (1881) South African records of *C. australis* can be decided only by examination of his specimens. *C. acanthina* var. *polygonia* Kluge (1914: 676, text-fig. 47), from Simon's Bay, placed by Marcus (1922) in the synonymy of his *C. acanthina* var. *australis*, differs from *C. capensis* in possessing five or six distal oral spines and widely divergent occlusor laminae. It is probably correctly regarded as a variant of *C. acanthina*.

Chaperia stephensoni O'Donoghue & De Watteville, 1935

Chaperia stephensoni O'Donoghue & De Watteville, 1935: 205, pl. 5 (fig. 1), pl. 6 (fig. 11). O'Donoghue, 1957: 74.

Material

Stations SM 163, SM 184.

Remarks

Only small dead fragments of this species were recovered. *C. stephensoni* may be recognized by the transversely oval opesia overarched by the distal wall of the zooid, and by the single distal avicularium, which has a characteristic elongate lanceolate rostrum curved slightly to the left or right at its tip. Two spine bases are visible at each distal corner and the sessile avicularium is often flanked on one or both sides by the swollen bases of erect avicularia.

Chaperia familiaris sp. nov.

Figs 3C–E, 7A

Material

Holotype: SAM–A26415, station SM 162, 32°55′S 28°31′E, 630 m.
Other material: stations SM 163, SM 180.

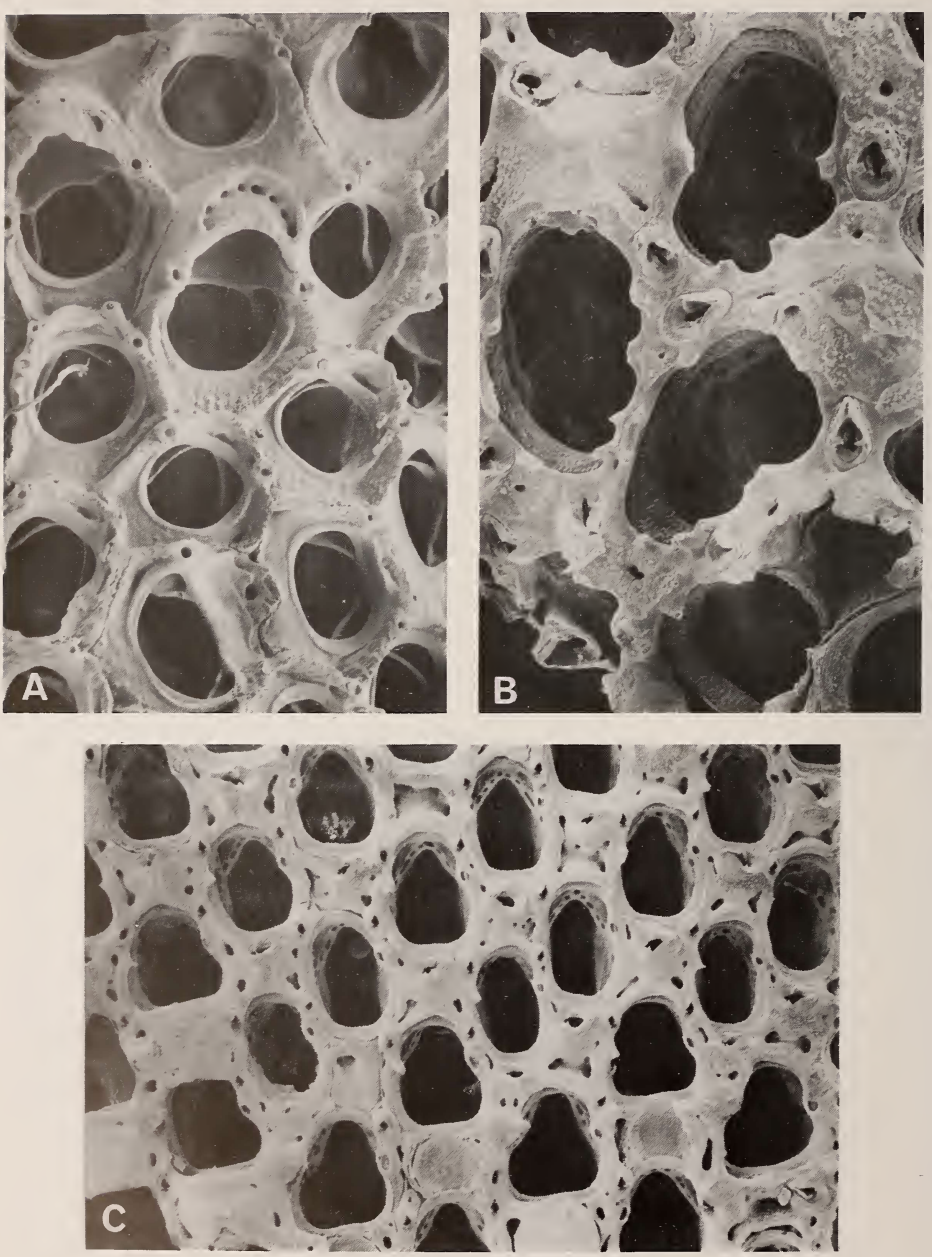

Fig. 7. A. *Chaperia familiaris* sp. nov. × 48. B. *Dactylostega prima* sp. nov. × 64. C. *Dactylostega tubigera* (Busk), BMNH 1887.12.9.3462. × 24.

Description

Colony encrusting, forming small patches, retaining a reddish-brown colour when preserved in alcohol, but fading when dried. Zooids hexagonal, occasionally rounded distally, typically as wide as long, but tending to broaden, separated by distinct sutures. Cryptocyst flat, finely granular, forming a symmetrical plate of constant width around two-thirds of the periphery of the opesia between the proximalmost pair of spines, its free edge distinctly bevelled. Opesia transversely oval, occupying approximately half the length of the frontal surface. Occlusor laminae distinct, each extending from a point one-third of the distance along the distal wall to the proximolateral corner of the zooid; not markedly convergent distally, although in damaged zooids they may be seen to join distally at the mid-line of the zooid. Two pairs of distolateral spines, distinctly shorter than the length of the opesia; distal pair cylindrical, proximal pair forked and slightly incurved. In brooding zooids only the proximal pair is present. Ovicell prominent, broader than long, hemispherical or somewhat irregular; ectooecium with a transversely oval frontal foramen. No avicularia.

Etymology

Familiaris (L.)—familiar, an allusion to the morphological features characteristic of the genus.

Remarks

Live specimens were obtained from all three stations, those from SM 162 and SM 180 were encrusting the large arenaceous foraminiferan *Schizammina pinnata* (Pearcey) (see p. 144). *C. familiaris* seems to be most similar to *C. capensis* (above) but differs in possessing two pairs of spines, most particularly in the short, forked proximal pair, and in its very characteristic ovicells.

Measurements (means of 10 values) in mm

Lz	lz	Lop	lop
0,48	0,47	0,30	0,31

Chaperia sp.

Fig. 9A

Material

Stations SM 163, SM 163/164, SM 180, SM 184, SM 185.

Description

Colony forming unilaminar sheets, encrusting or possibly erect, or only loosely attached to substratum. Zooids flat, typically broader than long, tapered proximally and rounded distally, 0,6–0,9 mm long by 0,7–1,0 mm

broad. Cryptocyst flat or slightly depressed distally, granular; opesia transversely oval, comprising up to two-thirds total length of zooid, no occlusor laminae visible. Distal border of zooid with seven to nine closely spaced spine bases. No avicularia or ovicells. Vertical walls very deep, up to 1,0 mm in some fragments; in basal view zooid boundaries are marked by distinct ridges. Both vertical and basal walls densely perforated by large multiporous septula, each in a distinct pit.

Remarks

Detached fragments of this distinctive species were found at each of the stations indicated. All were dead and worn, and none gave any indication of what the colony form might have been. It appears to belong to *Chaperia* but, in view of the poor state of the material and the uncertainty regarding the status of at least one South African species of this genus (p. 19), it seems inappropriate to assign a specific name.

Notocoryne Hayward & Cook, 1979

Notocoryne Hayward & Cook, 1979: 54.

Notocoryne cervicornis Hayward & Cook, 1979

Notocoryne cervicornis Hayward & Cook, 1979: 55, fig. 3.

Material

Stations SM 151, SM 163, SM 163/164, SM 180, SM 184, SM 185.

Remarks

The present material shows a greater range of colony size than that originally described by Hayward & Cook (1979), with specimens of 9,5 mm, 10 mm, and 11 mm in length. In all cases the characteristic faceted club-shape was constant. None of the colonies was alive when collected.

Family **Hiantoporidae** MacGillivray, 1895

Hiantoporidae MacGillivray, 1895: 60. Osburn, 1950: 97.

Dactylostega gen. nov.

Colony encrusting, unilaminar, or erect, bilaminar. Cryptocyst developed as a narrow rim; gymnocyst reduced, obscured. Avicularia interzooidal, developed from a series of chambers present between the autozooids; other chambers with simple frontal foramina assumed to be kenozooidal. Secondary calcification originating from interzooidal chambers, projecting over the frontal membrane of the autozooids as a series of blunt, irregular spikes infilling concavities between autozooids and forming an enveloping ooecial cover. Autozooids communicating with interzooidal chambers via small uniporous septula. Ovicell hyperstomial, closed by zooidal operculum. Spines absent.

Type species: *Dactylostega prima* sp. nov.

Etymology

Dactylos (Gr.)—finger; *stegos* (Gr.)—roof, describing the digitate frontal shield seen in later ontogeny.

Dactylostega prima sp. nov.

Figs 7B, 8A

Material

Holotype: SAM–A26416, station SM 185, 33°39,3′S 27°11,6′E, 90 m.

Other material: stations SM 131, SM 162, SM 163, SM 163/164, SM 164, SM 179, SM 180, SM 184, SM 185.

Description

Colony encrusting, unilaminar, or forming erect bilaminar sheets. Zooids oval, deep; boundaries clear at the growing edge of the colony, but obscured by the development of interzooidal avicularia and ?kenozooidal chambers. Opesia oval, rimmed by a narrow, granular, basally deflected cryptocyst with distinct beaded edge; of constant width around whole of opesia. Spaces between zooids infilled by a continuous series of chambers, some of which develop as avicularia, others forming irregular bodies with a frontal foramen (?opesia) surrounded by a granular area of calcification (?cryptocyst). Avicularia most frequently situated distolaterally to zooids, but often lateral in position as well, particularly at the bifurcation of zooid rows. Interzooidal calcification increasing in later ontogeny, appearing continuous over all of the interzooidal chambers and forming a continuous projecting rim around the opesia of each zooid, the edge developing short irregular processes that extend above the frontal membrane. Ovicell immersed, hyperstomial; slightly broader than long with a rather rectangular outline; apparently with a small central ectooecial fenestra in early ontogeny, later covered by calcification derived from the interzooidal chambers

Etymology

Primus (L.)—first, denoting the type species.

Remarks

The overarched 'pericystal' processes seen in *D. prima* produce an effect similar to that of the frontal shield seen in, for example, *Arachnopusia*. However, it may be seen from the micrographs (Fig. 7B) that in *D. prima* this calcification emanated from the curious interzooidal chambers that characterize the genus. The possible homology of the central foramen of the chamber and its surrounding area of granular calcification with the opesia and cryptocyst of the autozooid, and the small uniporous septula that link each chamber with the zooids adjoining it, suggest its kenozooidal nature.

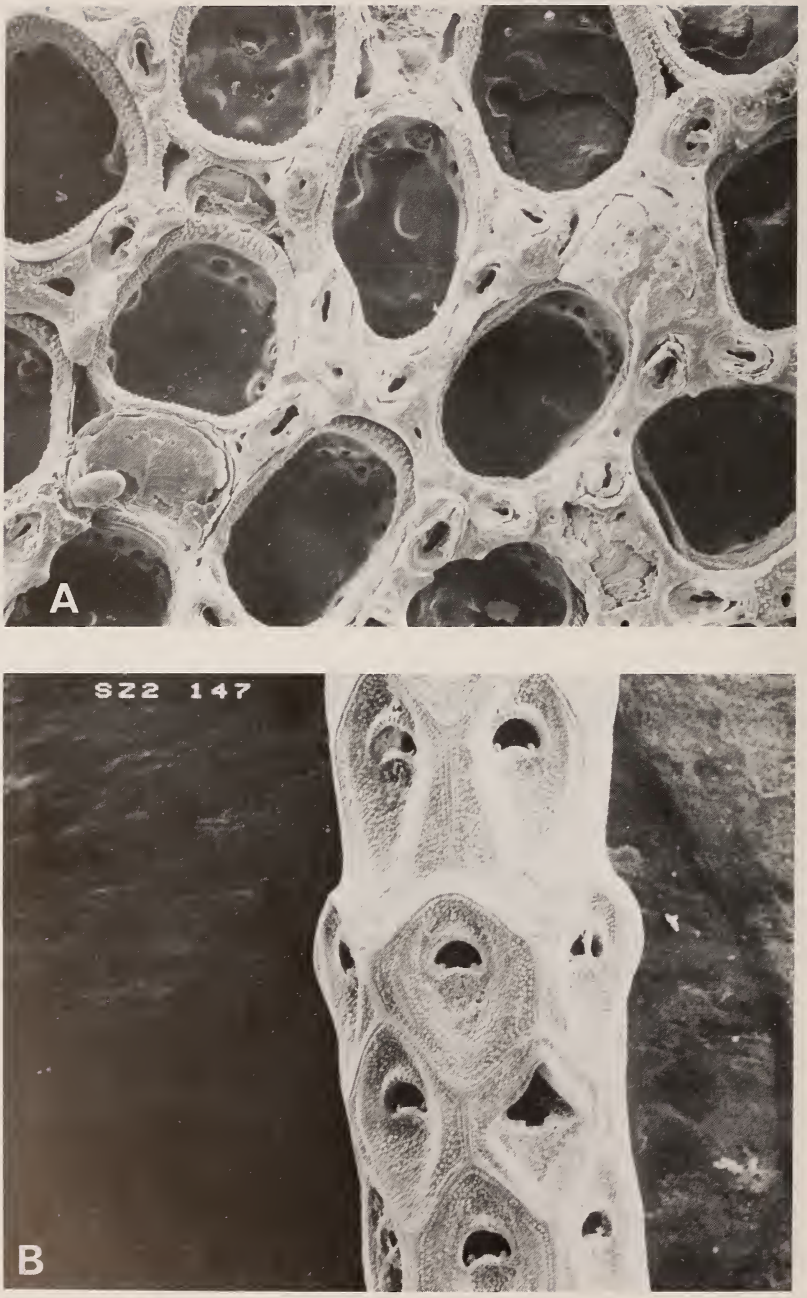

Fig. 8. A. *Dactylostega prima* sp. nov., showing ovicells and kenozooidal chambers in various stages of development. × 50. B. *Cellaria punctata* (Busk). × 80.

Live encrusting colonies were collected from each of the stations listed above, and dead fragments of bilaminar sheets were obtained from SM 180 and SM 164.

Foveolaria tubigera Busk (1884: 68), presently known only from Simon's Bay, Cape of Good Hope, shows many similarities to *D. prima*, in particular the interzooidal chambers, and clearly belongs in the same genus (see fig. 7C). Other species referable to *Dactylostega* are *Hincksina nigrans* (Hincks) (see Osburn 1950: 44, pl. 5 (figs 3–4)) and *Membraniporidra spissimuralis* as described by Hayami (1975: 102, pl. 13 (fig. 10)). Both these forms occur in the Northern Pacific, *D. nigrans* being circumarctic and *D. spissimuralis* Hayami (*non* Canu & Bassler) having been reported from the Pliocene of Japan. A similar development of supraopesial denticulations and frontal avicularia occurs in *Odontionella cyclops* var. *tessellata* (see Brown 1952).

Measurements (means of 25 values) in mm

Lz	lz
0,62	0,42

Family **Arachnopusiidae** Jullien, 1888

Arachnopusiidae Jullien, 1888: 62. Moyano, 1970: 260.

Arachnopusia Jullien, 1888

Arachnopusia Jullien, 1888: 62. Moyano, 1970: 260.

Arachnopusia corniculata sp. nov.

Fig. 9B–C

Material

Holotype: SAM–A26417, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 131, SM 163/164, SM 164, SM 250.

Description

Colony encrusting, unilaminar, zooids oval, separated by shallow grooves, distinct at growing edge, but obscured in later ontogenetic stages. Frontal membrane occupying most of frontal surface; a minimal area of smooth gymnocyst proximally, and a narrow, granular cryptocystal rim, occasionally developing a scalloped edge. Frontal shield developed from the proximal and lateral edges of the zooid as a variable number of processes, fused medially to obscure two-thirds of the total length of the frontal surface, leaving a D-shaped distal aperture and a variable number (typically 3–6) of irregularly shaped foramina. Area of each foramen subsequently reduced by further calcified processes, which may fuse to divide it into two. Proximal border of aperture straight, or developing a short, lobed or multipointed, medial process at an oblique angle to the frontal plane. Similar processes occasionally present on the

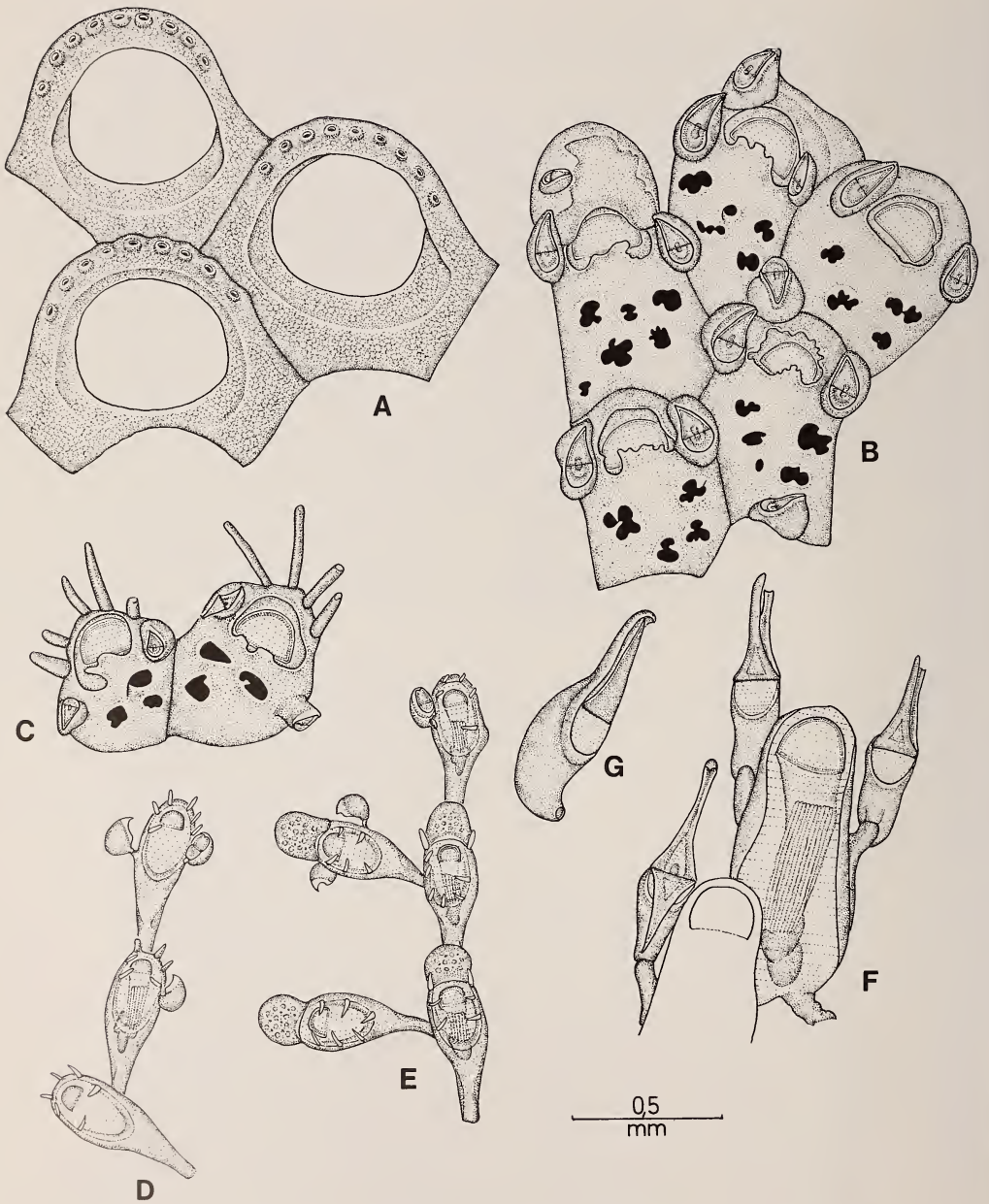

Fig. 9. A. *Chaperia* sp. B–C. *Arachnopusia corniculata* sp. nov. B. Zooids from the growing edge of the colony, including one with an ovicell. C. Two zooids from a juvenile colony showing stages in the development of the frontal shield. D–E. *Bugulella problematica* sp. nov. D. Zooids with distal spines, and avicularia developed from lateral septula. E. Zooids with spines almost encircling the opesiae; avicularia and zooids arising from lateral septula. F–G. *Beania rediviva* sp. nov. F. Showing the rounded distal end of the autozooid. Note that the rostra of the two distal avicularia are broken short. G. An avicularium in lateral view.

distal edge of the aperture; oral spines absent. Avicularia adventitious, typically paired, lateral to aperture; rostrum acute triangular, slightly curved, directed distally or distomedially. Less frequently, avicularia may occur proximally, on the edges of the zooid, with variable orientation. Ovicell hyperstomial, partly immersed, closed by zooidal operculum; as broad as long, smooth and imperforate, becoming obscured by calcification derived from the frontal shield of the distally succeeding zooid. Ancestrula tatiform, 0,4 mm long; opesia oval with a narrow cryptocyst, bordered by spines. First zooids budded from the ancestrula have five long oral spines.

Etymology

Corniculata (L.)—horned, referring to the lip of the aperture.

Remarks

The genus *Arachnopusia* has a wide distribution within the southern hemisphere, although none of the described species has been reported from South Africa. *A. corniculata* may be distinguished readily from other species of the genus by the relatively large, paired, oral avicularia, and in particular the laterally curved rostrum, and by the denticulate proximal border of the aperture. The absence of oral spines is also a distinctive feature.

Measurements (means of 25 values) in mm

Lz	lz
0,64	0,27

Family **Microporidae** Gray, 1848

Microporidae Gray, 1848: 115, 147. Ryland & Hayward, 1977: 112.

Micropora Gray, 1848

Micropora Gray, 1848: 115, 147. Ryland & Hayward, 1977: 112.

Micropora similis sp. nov.

Fig. 5B

Material

Holotype: SAM–A26418, station SM 163, 33°04,6′S 28°06,6′E, 90 m.

Other material: stations SM 163, SM 163/164, SM 164, SM 180, SM 233, SM 239, SM 250.

Description

Colony forming thin unilaminar sheets. Zooids small, broad and flat, hexagonal, or with proximal half distinctly tapered. Opesia (orifice) twice as wide as long, proximal border straight, lateral corners rounded to give a more or less elliptical effect; somewhat more angular in old or ovicellate zooids.

Lateral walls finely crenulate, slightly raised above the frontal surface, forming small scarcely discernible bosses adjacent to the opesia. Cryptocyst finely granular, punctured by numerous small pores; gently convex medially, distally becoming concave close to the opesiules and steeply raised at the proximal edge of the opesia. Opesiules situated close to opesia, distinct. Ovicell recumbent on succeeding zooid, wider than long and rather depressed, with a transverse frontal ridge, frequently developed medially into a low umbo. Avicularia developed sporadically throughout the colony, each situated immediately distal to an autozooid and orientated transverse to distalproximal axis; rostrum semi-elliptical or bluntly triangular, oblique to frontal plane of zooid, cross-bar slender, cylindrical.

Etymology

Similis (L.)—resembling, a reference to the similarity of this species to other members of the genus.

Remarks

This small species resembles the north-eastern Atlantic *Micropora normani* Levinsen, which also possesses interzooidal avicularia. *M. similis* is distinguished from this and other species of the genus, however, by its slender opesia and by the densely punctured frontal wall.

Measurements (means of 15 (zooids) or 10 (avicularia) values) in mm

Lz	lz	Lav
0,54	0,44	0,15

Family **Steginoporellidae** Hincks, 1884, emend. Bassler, 1953

Steganoporellidae Hincks, 1884: 358.
Steginoporellidae: Bassler, 1953: G171.

Steginoporella Smitt, 1873

Steginoporella Smitt, 1873: 15. Pouyet & David, 1979: 764.
Steganoporella: Cook, 1964*a*: 45.

Steginoporella buskii Harmer, 1900

Steganoporella buskii Harmer, 1900: 272, pl. 12 (fig. 13), pl. 13 (figs 33–35). Cook, 1964*a*: 46, pl. 1 (figs 1–3), fig. 1
Steginoporella buskii: Pouyet & David, 1979: 771, pl. 1 (fig. 9), text-fig. 2.

Material

Stations SM 131, SM 163, SM 163/164, SM 164.

Remarks

Fragments of living colonies were collected from stations SM 163/164 and SM 164, but the specimens from SM 131 and SM 163 were of dead, transported

material. The specimens resemble others from Port Elizabeth (the type locality) in having a fairly low level insertion of the cryptocyst in the distal wall (see Cook 1964*a*). Although *S. magnilabris* (Busk) is known from east Africa, all records of it from South Africa are referable to *S. buskii*.

Family **Macroporidae** Uttley, 1949

Macroporidae Uttley, 1949: 175. Brown, 1952: 134.

Macropora MacGillivray, 1895

Macropora MacGillivray, 1895: 54. Brown, 1952: 134.

Macropora africana sp. nov.

Fig. 5C–F

Material

Holotype: SAM–A26419, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163/164, SM 184, SM 185.

Description

Colony encrusting, unilaminar. Zooids broadly hexagonal, convex, separated by deep grooves. Primary orifice semi-elliptical, proximal border straight, closed by a distinctive calcified operculum with a finely granular, punctate surface. Four or five short, thickened, distal oral spines present but lost in later ontogenetic stages, only the brown chitinized bases remaining. Frontal wall finely granular, perforated by numerous small pores; large dietellae visible at the base of the vertical walls in zooids at the growing edge. Vicarious avicularia sporadically distributed throughout colony, of a primitive form; cystid of similar size to an autozooid, rostrum linguiform with a triangular palatal foramen. Ovicell inflated, large (0,8 mm long), obscuring most of the frontal wall of the succeeding zooid from which it is derived; with a frontal umbo and a series of conspicuous radiating striations and marginal slits, closed by zooidal operculum. Ancestrula similar to later zooids but smaller (0,56 mm long), with seven oral spines.

Etymology

Africanus (L.)—African.

Remarks

Macropora is an ancient genus known mostly from the Tertiary deposits of Australia and New Zealand. The type species, *M. centralis* MacGillivray (Miocene, Victoria), is possibly synonymous with *M. grandis* (Hutton) whose distribution in time extends from the Lower Miocene to the present (Brown 1952). Recent specimens have been reported from New Zealand (Uttley & Bullivant 1972) and the Philippines (Brown 1952). *M. grandis* is a larger species

than *M. africana*, with zooids up to 1,2 mm long, and is further distinguished by a proportionally more elongate operculum and distinct oral shelf, by the possession of a distinct raised peristome, by a complete absence of oral spines, and by the absence of a zooid orifice distal to the ovicell.

Measurements (means of 25 values) in mm

Lz	lz
0,78	0,62

Family **Cellariidae** Hincks, 1880

Cellariidae Hincks, 1880: 103. Ryland & Hayward, 1977: 119.

Cellaria Ellis & Solander, 1786

Cellaria Ellis & Solander, 1786: 18. Ryland & Hayward, 1977: 119.

Cellaria tectiformis Hayward & Cook, 1979

Cellaria tectiformis Hayward & Cook, 1979: 69, fig. 7.

Material

Stations SM 103, SM 131, SM 151, SM 233, SM 234.

Remarks

A single large, living, colony was obtained from each of the two stations SM 233, and SM 234.

Cellaria punctata (Busk, 1852)

Fig. 8B

Salicornaria punctata Busk, 1852: 366 (*partim*).
Cellaria gracilis: Marcus, 1922: 19, fig. 11.
Cellaria punctata: Harmer, 1926: 337, pl. 21 (figs 14–16), text-fig. 13a.

Material

Stations SM 163/164, SM 164, SM 180.

Description

Colony forming diffuse, straggling tufts up to 50 mm high. Joints consisting of tangled masses of brown, chitinous tubes, each arising from inconspicuous calcified sockets on the frontal surfaces of the zooids at the distal and proximal end of each internode, possibly representing kenozooids. Internodes straight or gently curved, up to 8 mm long, with a maximum width of 0,7 mm, typically broadening distally, with distinct dilatations along length; comprised of five to seven longitudinal series of zooids. Autozooids regularly

hexagonal, separated by distinct sutures; cryptocyst granular, concave, the central area particularly depressed and delimited by a prominent ridge. Opesia situated in distal third of zooid, semicircular; distal border raised, forming a distinct cowl, with finely beaded edge; proximal border with a projecting, rounded lip, and a pair of thick lateral denticles. Avicularia vicarious, infrequent, typically present at distal end of each internode, close to joint; as large as autozooid, with a broadly triangular rostrum occupying half frontal surface, supporting a distally directed triangular mandible. Proximal border of avicularian opesia with an anvil-shaped lip, distal corners of which fuse with sides of opesia to delimit paired lateral opesiules; palate scarcely developed, with a large rounded foramen. Fertile zooids constitute the characteristic dilatations, typically seven in a whorl; ovicellar orifice inconspicuous, largely occluded by a proximal projection from the succeeding zooid.

Remarks

This species was described by Busk (1852) from Queensland and redescribed by Harmer (1926), who examined material from a number of Indo-Pacific localities and included Marcus's (1922) South African specimens and Thornley's (1905, given as 1895 in error) Ceylon material of '*Cellaria johnsoni*' in his synonymy. The present material shows some differences from the specimens studied by Harmer (for example, Holborn Island, Queensland, BMNH 1928.9.13.87), most notably in zooid numbers. In the Holborn Island specimen each internode comprises four to six longitudinal series of zooids; in the *Meiring Naude* material the proximal end of each internode has five series of zooids, broadens rapidly to six, and has seven in the fertile swellings. The avicularian rostrum is more rounded in the Australian material, but zooid morphology and size are comparable with the South African specimens. A specimen from the Red Sea (BMNH 1963.8.10.37 pt.) is identical to the *Meiring Naude* specimens.

Measurements (means of 25 values) in mm

Lz	lz
0,48	0,29

Cellaria paradoxa Hayward & Cook, 1979

Cellaria paradoxa Hayward & Cook, 1979: 71, fig. 8.

Material

Station SM 103.

Remarks

Worn internodes of this species were present in the coarser sediment fraction from station SM 103. A somewhat similar species with dimorphic

zooids was described from the Eocene of North and South Carolina as *C. bifaciata* by Canu & Bassler (1920: 274, pl. 40 (figs 14–17)).

Family **Aspidostomatidae** Jullien, 1888

Aspidostomatidae Jullien, 1888: 77. Harmer, 1926: 322.

Aspidostoma Hincks, 1881

Aspidostoma Hincks, 1881: 159. Harmer, 1926: 323.

Aspidostoma livida sp. nov.

Fig. 10

Material

Holotype: SAM–A26420, station SM 239, 32°14,8′S 29°00,8′E, 90 m.
Other material: stations SM 131, SM 164, SM 184, SM 239.

Description

Colony erect, bilaminar, reticulate, forming broad, plate-like lobes, largest fragment obtained measuring 45 × 50 mm; alcohol-preserved material retaining a deep blue-grey colour. Fenestrulae up to 4 mm long, apparently regularly distributed, about four occurring in each cm^2 of colony surface. Zooids hexagonal, convex, separated by distinct grooves, thickly calcified with a coarsely granular surface. Frontal wall convex proximally, dipping distally towards a small deep-set opesia; proximal edge of opesia (delimiting the 'polypide tube') forming a thickened axehead-shaped lip. A thick median ridge extends for a short distance proximally from the outer edge of the opesial lip. Distal end of zooid raised as a prominent hood, frequently developed on each corner into short flattened processes. Operculum transversely oval, thickly calcified, white. Ovicell globose, rather flattened frontally, with a coarsely granular surface; opening via a hooded aperture distal to the zooid operculum. Interzooidal avicularia sporadically distributed over the colony; rostrum acute triangular, distolaterally directed; cross-bar incomplete, palate with an elliptical central foramen. Fenestrulae rimmed by single series of large kenozooids.

Groups of frontally budded zooids appear to inaugurate new laminae. The form of the colony could not be discerned, but the large bilaminar plates were flat or gently dished, rather than convoluted, and new plates appear to develop perpendicular to their predecessors. Unlike the fenestrate colonies of *Dimorphocella moderna* (see p. 48) from the same station, *A. livida* shows no formation of central ribs of calcification.

Etymology

Lividus (L.)—bluish, referring to the colour of the colony.

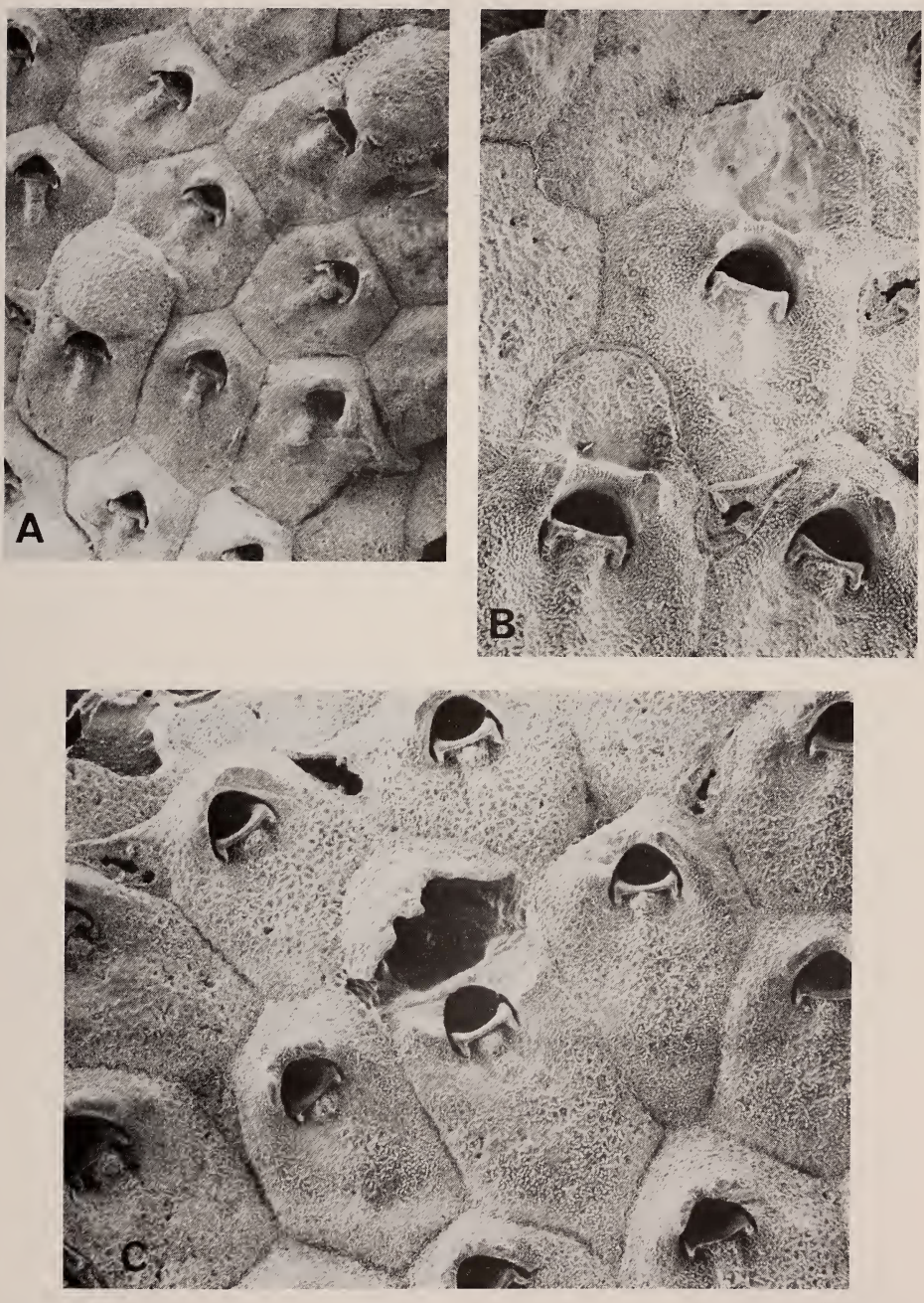

Fig. 10. *Aspidostoma livida* sp. nov. A. Portion of a colony, including two ovicelled zooids and (bottom right) two kenozooids. × 25. B. Developing ovicells, and avicularia. × 40. C. Detail of a damaged ovicell. × 40.

Remarks

The material from station SM 239 comprised a large number of reticulate fragments which may have represented just one large colony, no basal attachment was found. The only erect Recent species of *Aspidostoma* develop slender cylindrical colonies, although Waters (1905: 243) described specimens of *A. giganteum* (Busk) that displayed a loosely anastomosing form. Erect branched species of *Aspidostoma* were described from the Tertiary of New Zealand by Brown (1952).

Measurements (means of 25 values) in mm

Lz	lz
0,89	0,73

Family **Scrupocellariidae** Levinsen, 1909

Scrupocellariidae Levinsen, 1909: 130. Ryland & Hayward, 1977: 128.

Caberea Lamouroux, 1816

Caberea Lamouroux, 1816: 128. Ryland & Hayward, 1977: 128.

Caberea darwinii Busk, 1884

Caberea darwinii Busk, 1884: 29, pl. 32 (fig. 6c–f).
Caberea darwinii: Hastings, 1943: 374, pl. 5 (figs 1–3), text-figs 21, 22A–C, 23A–D, 24A.

Material

Stations SM 163/164, SM 179, SM 184, SM 185, SM 239.

Remarks

The geographical distribution of *Caberea darwinii* has been discussed at length by Hastings (1943). It extends from New Zealand westward to the Patagonian Shelf and is widespread in Antarctic and Subantarctic waters; it has been recorded from Kerguelen, Prince Edward Island, and Marion Island, but has not been reported before from South Africa.

Eupaxia Hasenbank, 1932

Eupaxia Hasenbank, 1932: 321, 363.

Eupaxia quadrata (Busk, 1884)

Cellularia quadrata Busk, 1884: 18, pl. 5 (fig. 5).
Eupaxia incarnata Hasenbank, 1932: 363, fig. 30A–C.
Eupaxia quadrata: Hayward & Cook, 1979: 63, fig. 6C–F.

Material

Station SM 232.

Remarks

This species was redescribed and figured by Hayward & Cook (1979). A single fragment of a live colony was collected during the present survey.

Menipea Lamouroux, 1812

Menipea Lamouroux, 1812: 183. Harmer, 1923: 339. Hastings, 1943: 331.

Menipea crispa (Pallas, 1766)

Cellularia crispa Pallas, 1766: 71.
Menipea crispa: Marcus, 1922: 11. Hastings, 1943: 332. O'Donoghue, 1957: 75, figs 1–2.

Material

Stations SM 163/164, SM 164, SM 179.

Remarks

M. crispa appears to have a limited geographical distribution, from Saldanha Bay (South Africa) to Madagascar (Hastings 1943). Live specimens were collected from each of the three *Meiring Naude* stations, which ranged in depth from 50 to 90 m.

Menipea triseriata Busk, 1852

Menipea triseriata Busk, 1852: 22, pl. 23 (figs 2–4).
Menipea triseriata: Harmer, 1923: 342, pl. 17 (fig. 18), pl. 19 (figs 40–42). O'Donoghue, 1957: 76.

Material

Stations SM 163, SM 164, SM 179, SM 180, SM 185.

Remarks

This distinctive species is known only from South Africa. The present material includes several very large, luxuriantly branched colonies.

Menipea ornata (Busk, 1852)

Cellularia ornata Busk, 1852: 20, pl. 20 (figs 3–4).
Menipea ornata: Harmer, 1923: 340.
Menipea flabellum: Marcus, 1922: 13, fig. 7.
Cellularia infantae O'Donoghue, 1924: 30, pl. 1 (fig. 6). O'Donoghue & De Watteville, 1935: 207; 1937: 12.

Material

Station SM 185.

Remarks

The confused synonymy of this species has been clarified by Harmer (1923) and by Hastings (1943: 332).

Menipea marionensis Busk, 1884

Menipea marionensis Busk, 1884: 21, pl. 4 (figs 3, 3a).
Menipea marionensis: Harmer, 1923: 341, pl. 17 (fig. 22), pl. 19 (figs 43–45).

Material

Stations SM 179, SM 180, SM 185.

Remarks

This species appears to be known only from the Cape of Good Hope. The present specimens were obtained living, at depths of 80 and 90 m.

Family **Bicellariellidae** Levinsen, 1909

Bicellariellidae Levinsen, 1909: 93. Ryland & Hayward, 1977: 146.

Bugulella Verrill, 1879

Bugulella Verrill, 1879: 472. Maturo & Schopf, 1968: 36.

Bugulella australis Hayward & Cook, 1979

Bugulella australis Hayward & Cook, 1979: 64, fig. 6A–B. Millard, 1980: 143.

Material

Station SM 233.

Remarks

The material comprised a tangled mass, probably representing several colonies, and was living when collected. Following its recent description in the first report of the *Meiring Naude* Bryozoa (Hayward & Cook 1979), substantial material was found in the *Galathea* deep-sea collections from a station in the Tasman Sea at 610 m (Hayward 1981).

Measurements (means of 20 values) in mm

Lz	Lop	lop
0,74	0,28	0,18

Bugulella problematica sp. nov.

Fig. 9D–E

Material

Holotype: SAM–A26421, station SM 233, 32°15,2′S 29°09,8′E, 540–580 m.

Description

Colony erect, straggling, delicate; composed of branching uniserial chains of zooids forming a dense tangled tuft. Zooids elongate, club-shaped: oval distally, tapered proximally to a slender tubaeform shape; thinly calcified and

translucent. Opesia oval, with a narrow cryptocyst border; typically with three pairs of slender spines regularly spaced around distal end, rarely up to ten spines distributed around whole of opesial border. Each zooid budding up to three new zooids: one distal, one on each side from a point level with the proximal half of the opesia. Distal bud constant, colony developing as a uniserial chain, some or all of whose members produce secondary chains, on one or both sides, perpendicular to the first; tertiary chains may form in the same way. The lateral budding points, marked by large, distinct septula, may instead give rise to irregularly tubular kenozooids that link with septula of zooids in neighbouring branches; rarely, such kenozooids develop at the distal budding point. Avicularia pedunculate, with short, semi-elliptical mandibles; single, more usually paired, arising from lateral budding points and thus precluding development of side chains where they occur. Rarely, a single avicularium develops distally, frontal to the proximal tubular portion of the next zooid. Ovicell prominent, terminal; spherical, with finely tessellated surface, closed by zooidal operculum.

Etymology

Problematicos (Gr.)—problematical.

Remarks

The budding pattern of *Bugulella problematica*, and the paired lateral avicularia, serve to distinguish it from *B. australis* (above), in which lateral branches are initiated by a second distal bud, which becomes fused with a tubular structure (?kenozooid) arising from the lateral septulum of its twin. The avicularium of *B. australis* is constantly distal in position, and the zooids tend to be larger than those of *B. problematica*. However, zooids of the latter species may be found with up to ten opesial spines, typical of *B. australis*, and the ovicell is practically identical in both species. Specimens of the two species were found intermingled in the same sample and some doubt must remain that the apparently significant difference in budding pattern may prove to be an astogenetic effect.

Measurements (means of 20 values) in mm

Lz	Lop	lop
0,51	0,25	0,15

Family **Beaniidae** Canu & Bassler, 1927

Beaniidae Canu & Bassler, 1927: 14. Ryland & Hayward, 1977: 150.

Beania Johnston, 1840

Beania Johnston, 1840: 272. Ryland & Hayward, 1977: 150.

Beania magellanica (Busk, 1852)

Diachoris magellanica Busk, 1852: 54, pl. 67 (figs 1–3).
Beania magellanica: Hastings, 1943: 414, figs 34C, 35G.

Material

Stations SM 163, SM 179, SM 239.

Distribution

Widespread; reported from the Mediterranean to the Falkland Islands, from Australia to Japan, and throughout the Indian Ocean. Recorded from South Africa by Marcus (1922) and O'Donoghue (1957).

Beania rediviva sp. nov.

Fig. 9F–G

Beania erecta: Hasenbank, 1932: 342, fig. 15A–C.

Material

Holotype: SAM–A26422, station SM 250, 31°59,3′S 29°22,5′E, 150–200 m.

Etymology

Redivivus (L.)—renewed, alluding to the newly recognized identity of the species.

Remarks

The Antarctic–Subantarctic *Beania erecta* Waters was redescribed by Hastings (1943: 416), who excluded Hasenbank's (1932) record from Agulhas Bank from her synonymy. Hasenbank's figure showed several significant differences from typical *B. erecta*: the distal ends of the zooids were smoothly rounded, lacking the paired lateral oral projections seen in *B. erecta*, and the avicularia were very large, with a slender, strongly hooked rostrum comprising almost half the total length. These features are shown particularly well in the present specimen (Fig. 9G) and it is appropriate to introduce a new name for Hasenbank's species.

Family **Bugulidae** Gray, 1848

Bugulidae Gray, 1848: 110, 146. Ryland & Hayward, 1977: 151.

Bugula Oken, 1815

Bugula Oken, 1815: 89. Ryland & Hayward, 1977: 151.

Bugula dentata (Lamouroux, 1816)

Acamarchis dentata Lamouroux, 1816: 135, pl. 3 (fig. 3a–b).
Bugula dentata: O'Donoghue, 1924: 33; 1957: 82. Harmer, 1926: 439, pl. 30 (figs 5–6), pl. 32 (figs 21–25).

Material

Station SM 180.

Remarks

This well-characterized species was reported from South Africa by O'Donoghue (1924), who collected it on the lower shore at Agulhas Light, Cape Province. All South African records were documented in a later paper (O'Donoghue 1957).

Family **Cribrilinidae** Hincks, 1880

Cribrilinidae Hincks, 1880: 182. Hayward & Ryland, 1979: 56.

Cribrilaria Canu & Bassler, 1929

Cribrilaria Canu & Bassler, 1929: 33. Hayward & Ryland, 1979: 62.

Cribrilaria innominata (Couch, 1844)

Lepralia innominata Couch, 1844: 114, pl. 22 (fig. 4).
Cribrilaria innominata: Harmelin, 1970: 84, figs 1d–f, 2, pl. 1 (figs 4–6). Hayward & Ryland, 1979: 64, fig. 17.

Material

Stations SM 163, SM 163/164.

Remarks

This widespread species is characterized by its umbonate frontal shield, and the presence of a large, conspicuous, suboral lacuna. Live colonies were collected at both of the above stations.

Cribrilaria venusta (Canu & Bassler, 1925)

Fig. 11A

Puellina venusta Canu & Bassler, 1925: 22, pl. 2 (fig. 5).
Cribrilaria venusta: Harmelin, 1976*a*: 180, pl. 2 (figs 3–5).

Material

Station SM 239.

Remarks

This is a distinctive species recognized initially by its broad and relatively flat frontal shield composed of numerous slender costae. These are usually little thickened, though occasionally developing a series of peripheral knobs. The first pair of costae proximal to the orifice fuse and thicken medially to form a triangular umbo and there are no suboral pores; conversely the pores between the umbonate first pair of costae and the second pair are typically large and distinct. There are five oral spines. The avicularian rostrum is slender, acuminate, and frequently with a gentle lateral curve.

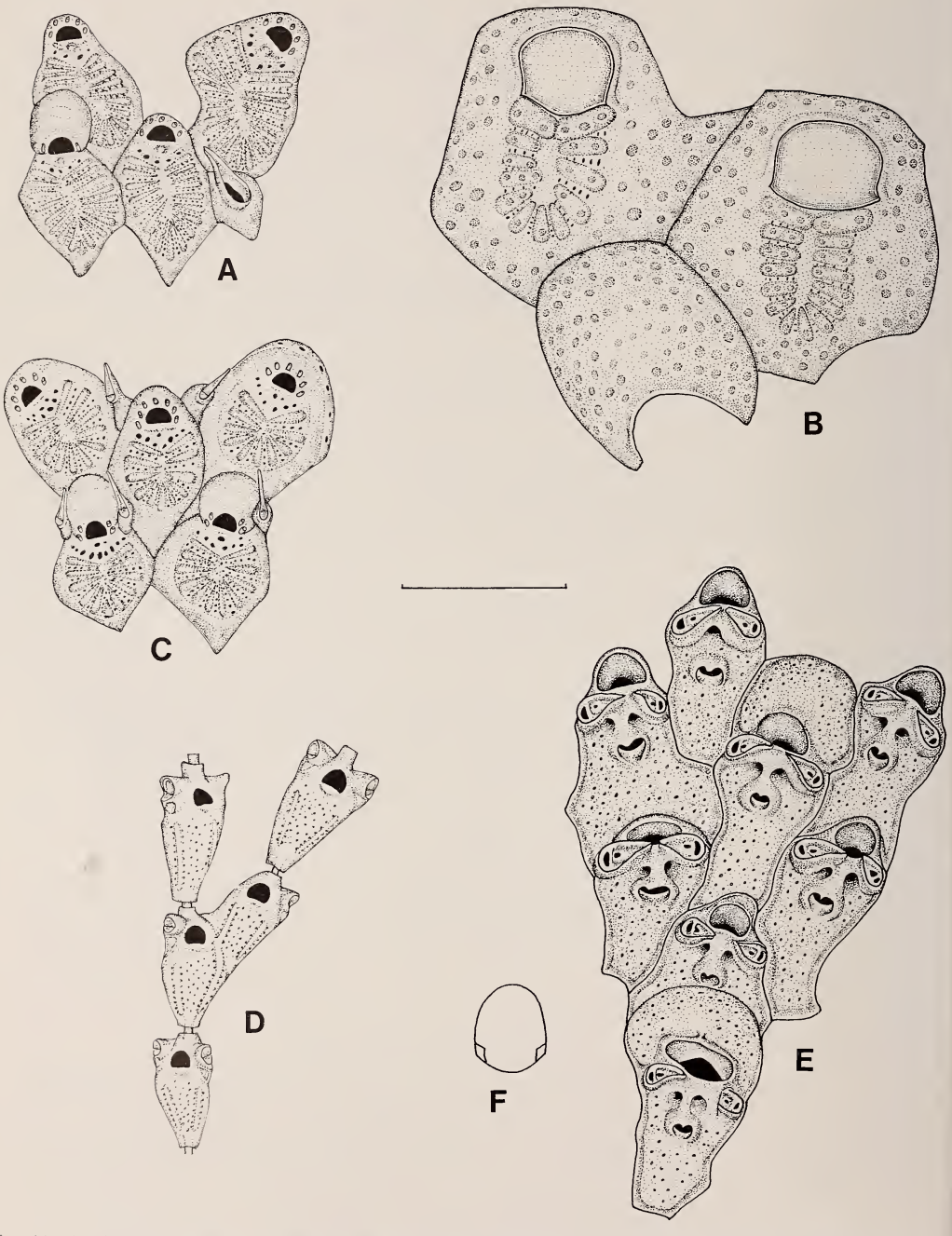

Fig. 11. A. *Cribrilaria venusta* (Canu & Bassler). B. *Figularia* sp., two zooids, with an ovicell from a missing zooid. C. *Cribrilaria africana* sp. nov., a specimen from SM 164. D. *Vittaticella* sp. E–F. *Gigantopora foraminosa* sp. nov. E. Portion of a branch, showing progressive elaboration of the spiramen. F. Outline diagram of primary orifice. Scale = 0,5 mm for A–D, F; 1 mm for E.

Cribrilaria venusta has only recently been redescribed by Harmelin (1976*a*), who summarized its known distribution. The present material is closely similar in zooid size (0,46–0,6 mm × 0,38–0,44 mm) and morphology to specimens collected from the western end of the English Channel. Although the present record marks a significant extension of its geographical range, the distribution of *C. venusta*, like those of other species of *Cribrilaria*, is imperfectly known and will probably prove to be very broad.

Cribrilaria africana sp. nov.

Fig. 11C

Material

Holotype: SAM–A26423, station SM 164, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163, SM 250.

Description

Colony encrusting. Zooids oval, rather flat; costate frontal shield comprising larger part of frontal surface, with only a narrow rim of gymnocyst. Costae with small marginal tubercles, but without a central umbo. Orifice with straight, smooth proximal edge, six or seven closely spaced oral spines. Suboral region (between orificial bar and first pair of frontal costae) broad, triangular and flat, with up to five large pores, and many small pores. Avicularium small, squeezed in between successive zooids, or occasionally developed on gymnocyst, semi-pedunculate; rostrum slender, *c.*0,1 mm long. Ovicell small, spherical, hyaline, with a small, median umbo, frequently with an avicularium closely adjacent to it on each side.

Etymology

Africanus (L.)—African.

Remarks

This species is readily distinguishable from those reviewed by Harmelin (1976*a*) by the conspicuous suboral pores and the small semi-pedunculate avicularium.

Measurements (means of 16 values) in mm

Lz	lz
0,39	0,29

Figularia Jullien, 1886

Figularia Jullien, 1886: 608. Hayward & Ryland, 1979: 70.

Figularia philomela (Busk, 1884)

Cribrilina philomela Busk, 1884: 132, pl. 17 (fig. 6).
Figularia philomela: Hayward & Cook, 1979: 76, fig. 9B.

Material

Station SM 163.

Remarks

The present material, comprising several small encrusting live colonies, was collected in waters far shallower than those sampled by the first series of *Meiring Naude* stations.

Figularia sp.

Fig. 11B

Material

Station SM 163.

Remarks

The material comprised two fragments of live colonies, the largest including five complete zooids, together with portions of four others. The zooids were large and flat (0,8–0,9 mm × 0,7–0,8 mm); the costate frontal shield was small, constituting less than half of the total frontal surface, although costae and intercostal pores were distinct. Two or more large pseudopores were present on each of the costae, and the rest of the frontal surface, and the surface of the ovicell, were covered with similar pseudopores, indicated by brown chitinized cuticle. This species does not seem to have been described before, but the paucity of material precludes a complete description being presented here.

Family **Exochellidae** Bassler, 1953

Exochellidae Bassler, 1953: G205. Hayward & Ryland, 1979: 78.

Escharoides Milne Edwards, 1836

Escharoides Milne Edwards, 1836: 218. Hayward & Ryland, 1979: 78.

Escharoides contorta (Busk, 1854)

Eschara contorta Busk, 1854: 89, pl. 108 (figs 1–3).
Mucronella contorta: Busk, 1884: 155, pl. 20 (fig. 9). O'Donoghue & De Watteville, 1937: 18.
Escharoides contorta: O'Donoghue, 1957: 88, figs 10–11.

Material

Stations SM 151, SM 162, SM 163, SM 163/164, SM 164, SM 180, SM 184, SM 185, SM 239.

Remarks

This species is known only from South Africa. It was particularly abundant in the present collections and live colonies were collected from most of the stations listed. Colony form varied greatly, from simple encrusting sheets to broad bilaminar plates and slender, branching cylindrical growths.

Family **Adeonidae** Jullien, 1903

Adeonidae Jullien *in* Jullien & Calvet, 1903: 53. Cook, 1973: 246.

Dimorphocella Maplestone, 1903

Dimorphocella Maplestone, 1903: 140.

Description

Colony erect, branching, bilaminar. Autozooids with sinuate secondary calcified orifice. Frontal shields umbonuloid, zooids surrounded by marginal frontal septula. Brooding zooids dimorphic, large, with wide, non-sinuate orifices; frontal shields with several spiramina. Adventitious avicularia unilateral or paired, acute; interzooidal marginal avicularia sometimes present, mandibles slung on paired condyles.

Remarks

The genus is inferred to have umbonuloid ontogeny of zooid frontal shields, as in *Adeona* and *Adeonellopsis* (see Cook 1973). The enlarged brooding zooids and condylate avicularia are also characteristic of the family. *Dimorphocella* differs from the other genera in the strongly sinuate autozooid orifice, and the apparent lack of frontal spiramen pores in autozooids.

Dimorphocella is known from the Tertiary of Australia, but has not been reported as Recent (see below). The genus was introduced somewhat informally by Maplestone (1903), who stated, 'I propose this genus for a form presently to be described, and *Adeonella triton* McG'. The species then described, *D. pyriformis* Maplestone (1903: 141, pl. 16 (fig. 1)), was illustrated with strongly sinuate autozooid orifices, and paired, medially orientated avicularia. The brooding zooids had an enlarged distal cavity and a central, circular, porous frontal area, and paired avicularia orientated distally. *Adeonella triton* MacGillivray (1895: 90, pl. 19 (fig. 23)) was originally described with similar characters, except that the autozooidal avicularia were unilateral and the brooding zooids were not distally expanded. *A. triton*, as later described by Maplestone (1903, pl. 16 (fig. 2)) had paired, distally orientated avicularia and a denticulate process on the proximal side of the brooding zooid orifice, but appears to be the same species. Although Canu & Bassler (1920: 571, fig. 170A–B; 1929: 384) indicated *A. triton* as 'genotype' of *Dimorphocella*, Maplestone's (1903) choice was definite, if unorthodox, and *D. pyriformis* was later listed as type species by Bassler (1935: 95; 1953: G213, fig. 161, 5). Canu & Bassler (1920) included *Dimorphocella portmarina*

Maplestone (1913: 359, pl. 28 (fig. 5)), a Recent Australian species, in *Dimorphocella*, but this form has conspicuous autozooidal spiramina and is referable to *Adeona* (see Canu & Bassler 1929).

Waters (1881: 340, pl. 18 (fig. 85)), described another Tertiary Australian species as *Schizoporella submersa*. No brooding zooids were described and none have been found in specimens in the British Museum (Natural History) collections (D32901–2, D34733, see fig. 14A). The autozooidal characters of *S. submersa* are similar to those of *D. pyriformis*. *S. submersa* as described by MacGillivray (1895: 82, pl. 11 (figs 8–9)) may not be the same species (see Brown 1958: 60).

Dimorphocella moderna sp. nov.

Figs 12–13

Material

Holotype: SAM–A26424, station SM 239, 32°14,8′S 29°00,8′E, 90 m.
Other material: stations SM 164, SM 179, SM 180, SM 185, SM 250.

Description

Colony erect, bilaminar, fenestrate, deeply pigmented, formed of slightly curved, frequently anastomosing plates. Central part of plates becoming thickened and forming branched strengthening ribs. Zooids arranged in alternate bifurcating and recombining series, forming fenestrulae that are bordered by large interzooidal avicularia. Autozooids with a complete series of marginal frontal septula, sometimes with additional frontal septula. Frontal shields otherwise imperforate except for a suboral spiramen which is occluded early in ontogeny. Secondary calcified orifice with a deep proximal sinus. Brooding zooids very large, raised distally, with a wide orifice, denticulate proximally. Central frontal area with several spiramen pores. Adventitious avicularia usually unilateral, occasionally absent in autozooids, in all cases orientated distally. Large, interzooidal fenestral avicularia acute, with raised rostra, mandibles hinged on prominent paired condyles, orientated distally.

Etymology

Modernus (L.)—of the present, referring to the Recent occurrence of the species.

Remarks

D. moderna is represented by worn fragments from all the stations listed, except from SM 239. This station provided abundant material that was alive when collected. Although no complete colony is present, and the substratum and mode of attachment is unknown, the larger plates indicate that colonies probably exceed 100 mm in height or diameter. Each plate is slightly curved, and the zooids on the outward-facing convex side are occluded by extrazooidal

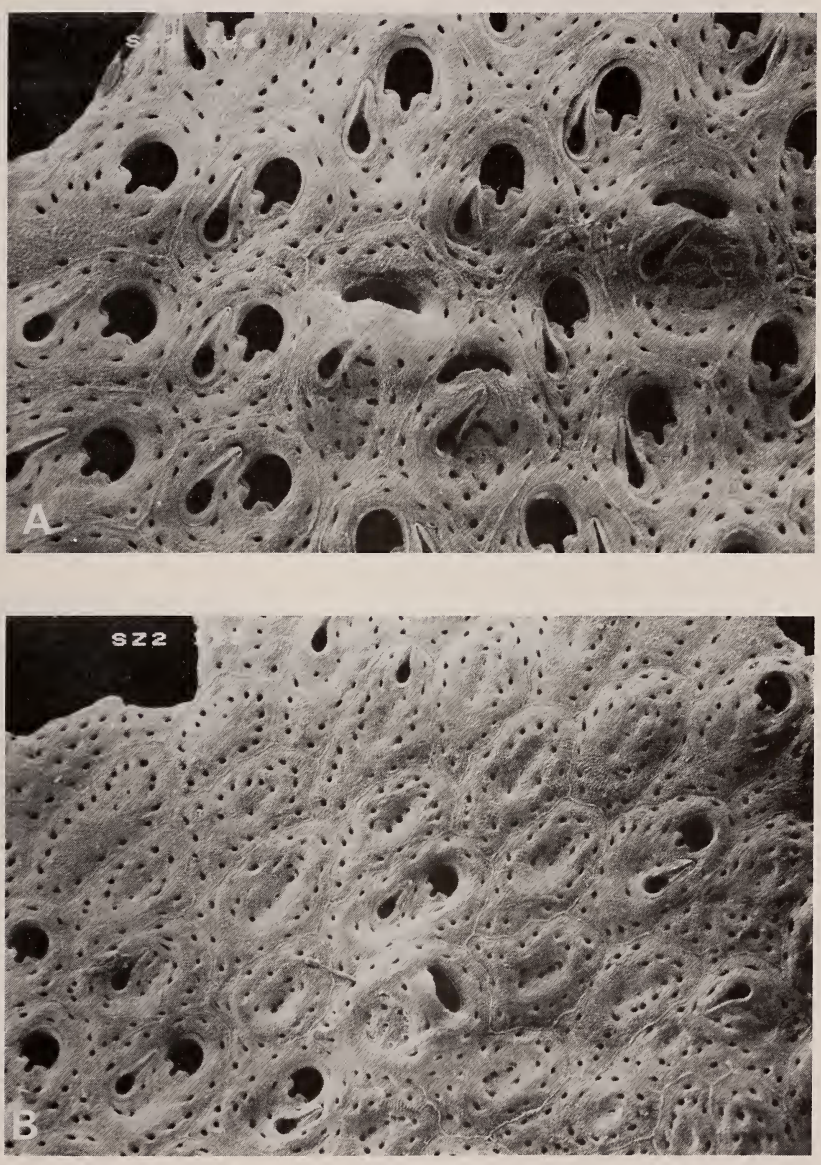

Fig. 12. *Dimorphocella moderna* sp. nov. A. Frontal surface of a branch, showing dimorphic orifices. × 48. B. Basal surface. × 36.

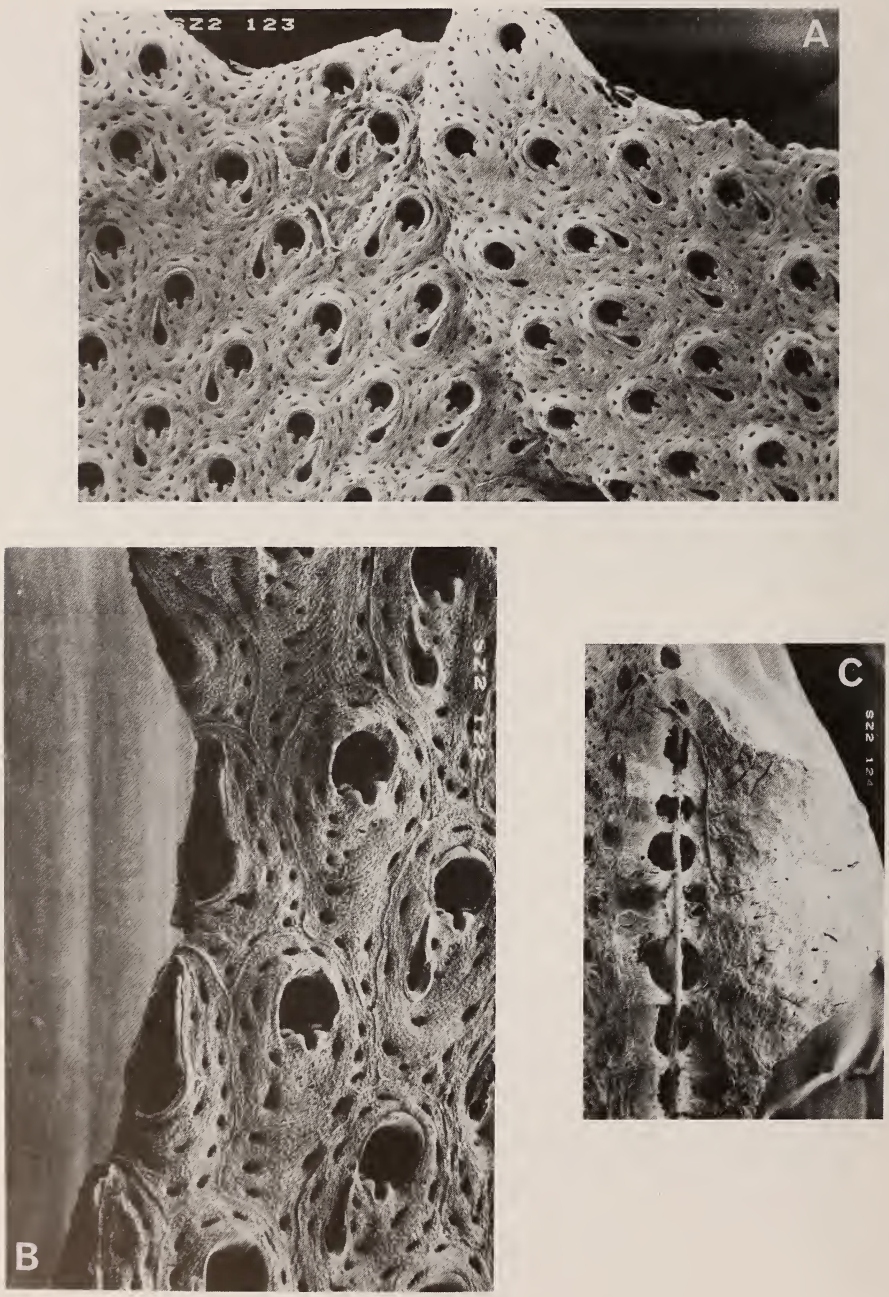

Fig. 13. *Dimorphocella moderna* sp. nov. A. Detail showing fusion of two branches. × 27. B. Margin of a branch with vicarious avicularia. × 66. C. Section of a branch showing frontal thickening. × 24,5.

calcification earlier in astogeny than those of the concave surface (see Fig. 12A–B). Although the budding pattern of plates is primarily in one plane, secondary plates arise later in astogeny at right angles to the primary plates, and anastomose with them. These secondary plates originate from a frontally budded group of three to seven zooids that later form a bilaminar expansion. The central rib of each plate is formed by localized thickening of the frontal shields of zooids, which becomes extrazooidal. The thickening also occurs on the convex surface in advance of that on the concave surface (Fig. 13C), but at the base of the colony is equally developed on both surfaces, forming a cylinder 6 mm in diameter. The frontal shields may exceed 2,80 mm in thickness, but the zooidal cavity is not occluded. Neighbouring unthickened zooids, even at the base of the colony, possess lophophores, and are inferred to have been capable of feeding. The fenestrulae are oval and are formed by the regular bifurcation and recombination of zooid series. They are more frequent in occurrence than those of *Aspidostoma livida* (see p. 36). Some growing edges that had been damaged before collection show that regenerated zooids (with lighter pigmentation) re-form fenestrulae in the same position as before. There is some variation in orifice width among autozooids (see Fig. 13A). This appears to be related to the bifurcation and recombination of series, but by analogy with *Adeonella* (see Harmer 1957), may also reflect a sexual function.

The umbonuloid nature of the frontal calcified shield may be seen at the growing tip of a few young secondary branches of anastomosing plates, which have been protected. The exposed growing edges of the primary plates have been damaged. The minute frontal spiramen is apparently occluded early in ontogeny. This may be correlated with the presence of a sinus in the secondary calcified orifice. This, by analogy with similar sinuate cryptocystidean forms (e.g. *Laminopora*), would allow passage of water into the ascus during protrusion of the lophophore.

Colonies are the substratum for several encrusting bryozoans, cirripedes, foraminifera, serpulids, etc., and have numerous small ophiuroids in the cavities formed by the anastomoses of plates.

No Recent species truly referable to *Dimorphocella* has been reported before (see above), and the genus does not now seem to be represented in Australian seas. Fossil Australian colonies were erect and branched, but *D. moderna* resembles the fenestrate colonies of *Adeona*, which are found from the Australian Tertiary-to-Recent. These colonies reach a height and diameter of 25 cm, and are attached and supported by flexible rooting structures formed by alternating cuticular and calcified kenozooidal elements. Large colonies of *Adeona* also develop strengthening ribs by extrazooidal frontal calcification. At present, the attachment of both *D. moderna* and the fenestrate *Aspidostoma livida*, which were abundant at station SM 239, is unknown.

D. moderna closely resembles *D. triton*, differing in its colony form and the presence of fenestral avicularia.

Measurements (means of 20 values) in mm

Lz	lz	Lbr.z	lbr.z
0,61	0,35	0,69	0,53
Lor	lor	Lbr.or	l.br.or
0,15	0,13	0,06	0,21
Lad.av.	Lint.av		
0,24	0,45		
Lm	lm		
0,14	0,25		

Family **Exechonellidae** Harmer, 1957

Exechonellidae Harmer, 1957: 651.

Exechonella Duvergier, 1924

Exechonella Duvergier, 1924: 18, see Cheetham, 1966: 62. Canu & Bassler, 1927: 4. Cook, 1967: 337.

Exechonella sp.

Fig. 5G

Material

Stations SM 164, SM 185, SM 250.

Remarks

Only small and badly damaged colonies of this species were found. The zooids were up to 1,3 mm long by 0,9 mm broad, pyriform in shape with the distal end formed into a tubular peristome, broken short in all cases. The frontal wall consists of an umbonuloid shield perforated by large round pores, rimmed by concentric calcification, indicating that they are progressively infilled. Avicularia, spines and ovicells were not evident. Sufficient detail of the zooid morphology was preserved to suggest that this is a species of *Exechonella* (Cook 1967), but the material was too damaged to permit identification to species.

Family **Watersiporidae** Vigneaux, 1949

Watersiporidae Vigneaux, 1949: 15, 20.

The family includes genera with finely pseudoporous frontal shields and opercula with well-developed sclerites. Avicularia are usually absent, but polymorphic zooids may occur (Cook 1979). Ovicells are present in some species of *Pachycleithonia* but absent in other genera.

Pachycleithonia Canu & Bassler, 1930

Pachycleithonia Canu & Bassler, 1930: 25. Cook, 1983*b*.

Colonies encrusting. Zooids large; orifice with almost rectangular sinus and often massive condyles. Frontal cuticle and opercula dark brown or purple.

The affinities and general characters of the genus, which has a worldwide tropical and subtropical distribution, have been discussed by Cook (1983*b*). Ovicellate brooding zooids have not been described in the type species, *P. nigra* Canu & Bassler, from the Galapagos Islands, but distinctive, reticulate, hyperstomial ovicells are known in *P. mutabilis* and *P. africana*.

Pachycleithonia mutabilis (Canu & Bassler, 1929)

Fig. 14B

Galeopsis mutabilis (?partim) Canu & Bassler, 1929: 273, pl. 28 (figs 4–5), ?fig. 111A–B, *?non* pl. 28 (fig. 6).
Gigantopora mutabilis: Harmer, 1957: 883, pl. 40 (fig. 8).
Pachycleithonia mutabilis: Cook, 1983*b*.

Material

Stations SM 129, SM 131.

Description

Pachycleithonia with elongated tubular peristome and large peristomial spiramen. Zooids communicating by distal and lateral septula situated at the base of the vertical walls, surrounded by calcified buttresses. Frontal septula large: one pair on each side of the orifice, another pair at each lateral corner of the zooid. Ovicell hyperstomial not closed by the zooidal operculum; formed by a very thinly calcified, or wholly cuticular inner capsule derived from the maternal zooid, surrounded by a reticulate ooecial cover derived from the frontal shield of the distal zooid.

Remarks

The *Meiring Naude* material consists only of three small fragments, one of which has a single ovicell. Like many of the species described here, *P. mutabilis* is a relatively shallow-water form and these specimens represent transported debris. The elongated peristome, with its prominent spiramen, is easily damaged and is not present in all zooids.

Both Harmer (1957) and Cook (1983*b*) have noted that the material originally described by Canu & Bassler (1929) from the Philippine Islands appears to have comprised two species. One of these (Canu & Bassler 1929, pl. 28, figs 4–5) resembles the material described by Harmer (1957) from Indonesia, and also the *Meiring Naude* fragments; the other (pl. 28, fig. 6) has larger zooids and was described as having minute lateral oral avicularia. However, this latter photograph had been retouched, and it appears that the 'avicularia' are, in fact, the elongated cavities (areolae) above a distal pair of frontal septula. A. H. Cheetham (1979 *in litt.*) examined the original specimen and commented, 'They do appear to be aerolae, and . . . can be seen to lie above large septular openings'. The opercula figured by Canu & Bassler (1929, fig. 111A–B) might have originated from either or both of their specimens. The

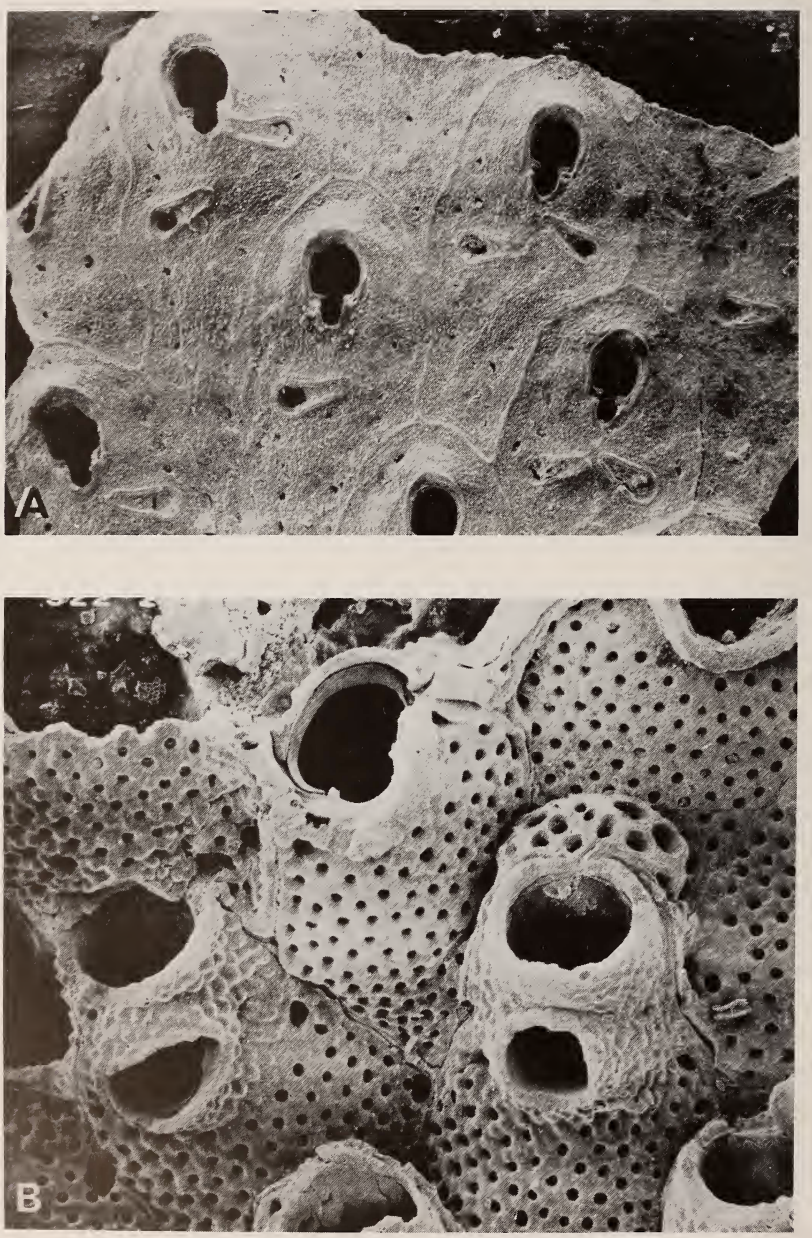

Fig. 14. A. *Dimorphocella submersa* (Waters). × 63. B. *Pachycleithonia mutabilis* (Canu & Bassler), BMNH 1882.10.18.46. × 64.

opercula of the *Siboga* specimens, and of a specimen from the Mascarene Islands (BMNH 1882.10.18.46), closely resemble those of *Watersipora arcuata* Banta (see Ryland 1974, fig. 3B), and those of the west African species *P. africana* Cook (1983*b*). *P. africana* is very similar to *P. mutabilis* in several other characters, and also has reticulate ovicells. Unlike *P. mutabilis*, however, the ovicell is closed by the operculum, and although the peristome is elongated it is not tubular and a spiramen rarely develops.

Distribution

P. mutabilis is known from the Philippines and Indonesia, Mauritius and south-east Africa.

Family **Euthyrisellidae** Bassler, 1953

Euthyrisellidae Bassler, 1953: G226.

Tropidozoum Harmer, 1957

Tropidozoum Harmer, 1957: 1106. Cook, 1975: 161. Cook & Chimonides, 1981*b*: 64.

Colonies rooted, cellariiform, internodes connected by cuticular kenozooidal joints. Zooid frontal surfaces occupying only part of the curved face of the internode; the other side consisting of a column of extrazooidal coelom, limited by a cuticular wall. Frontal shields depressed, with foramina; hypostegal coelom on both sides of the calcification. Brooding zooids large, with inflated basal walls and dimorphic orifices. Avicularia absent.

The characters and relationships of this interesting genus are discussed by Cook & Chimonides (1981*b*).

Tropidozoum burrowsi Cook & Chimonides, 1981

Tropidozoum sp. Cook, 1975: 165, pl. 1 (*NB* explanation of pls. 1 and 3 transposed), fig. 2B.
Tropidozoum burrowsi Cook & Chimonides, 1981*b*: 65, figs 5–6, 10.

Material

Stations SM 131, SM 151.

Description

Tropidozoum with narrow basal coelom. Zooids with small frontal foramina; orifice with a deep triangular sinus. Orifice of brooding zooid wide, without a sinus.

Remarks

T. burrowsi is known to live in relatively shallow water (15 m), as does the closely related Indonesian species, *T. cellariiforme* Harmer. The worn internodes from stations SM 131 and SM 151 (780 m and 900 m respectively) have obviously been transported. Previous records from South Africa (BMNH

1949.11.10.184, off Durban, 90 m) were also of transported internodes, and it would appear that living colonies will eventually be found only in shallow or coastal waters.

Distribution

Madagascar and South Africa.

Family **Smittinidae** Levinsen, 1909

Smittinidae Levinsen, 1909: 335. Hayward & Ryland, 1979: 98.

Smittina Norman, 1903

Smittina Norman, 1903: 120. Hayward & Ryland, 1979: 98.

Smittina sitella sp. nov.

Fig. 15D–E

Material

Holotype: SAM–A26425, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163, SM 163/164, SM 185, SM 239.

Description

Colony encrusting. Zooids oval, convex, separated by distinct grooves. Primary orifice slightly wider than long, proximal border largely occupied by a very broad lyrula, condyles small and generally inconspicuous. Peristome well developed, deep, distal border encroaching on to frontal surface of succeeding zooid, typically bearing one or two lateral lobes and incorporating medioproximally a conical avicularian cystid. Rostrum situated on distal face of cystid, elongate, triangular, acute to frontal plane. Adventitious avicularia also present adjacent to orifice, typically paired, occasionally single; cystid short, conical, rostrum directed laterally, or proximally, or oblique to either direction. Frontal wall finely granular with a few widely spaced pores, each becoming deeply immersed and conspicuous in later ontogeny. With the development of the suboral avicularium the pores proximal to the orifice become occluded and in highly calcified zooids frontal perforation appears to be limited to marginal areas. Ovicell hyperstomial, prominent, spherical, with regularly spaced pores. Ectooecium produced as a conspicuous frontal lip.

Etymology

Sitella (L.)—a little bucket, referring to the shape of the ovicell.

Measurements (means of 20 values) in mm

Lz	lz
0,67	0,44

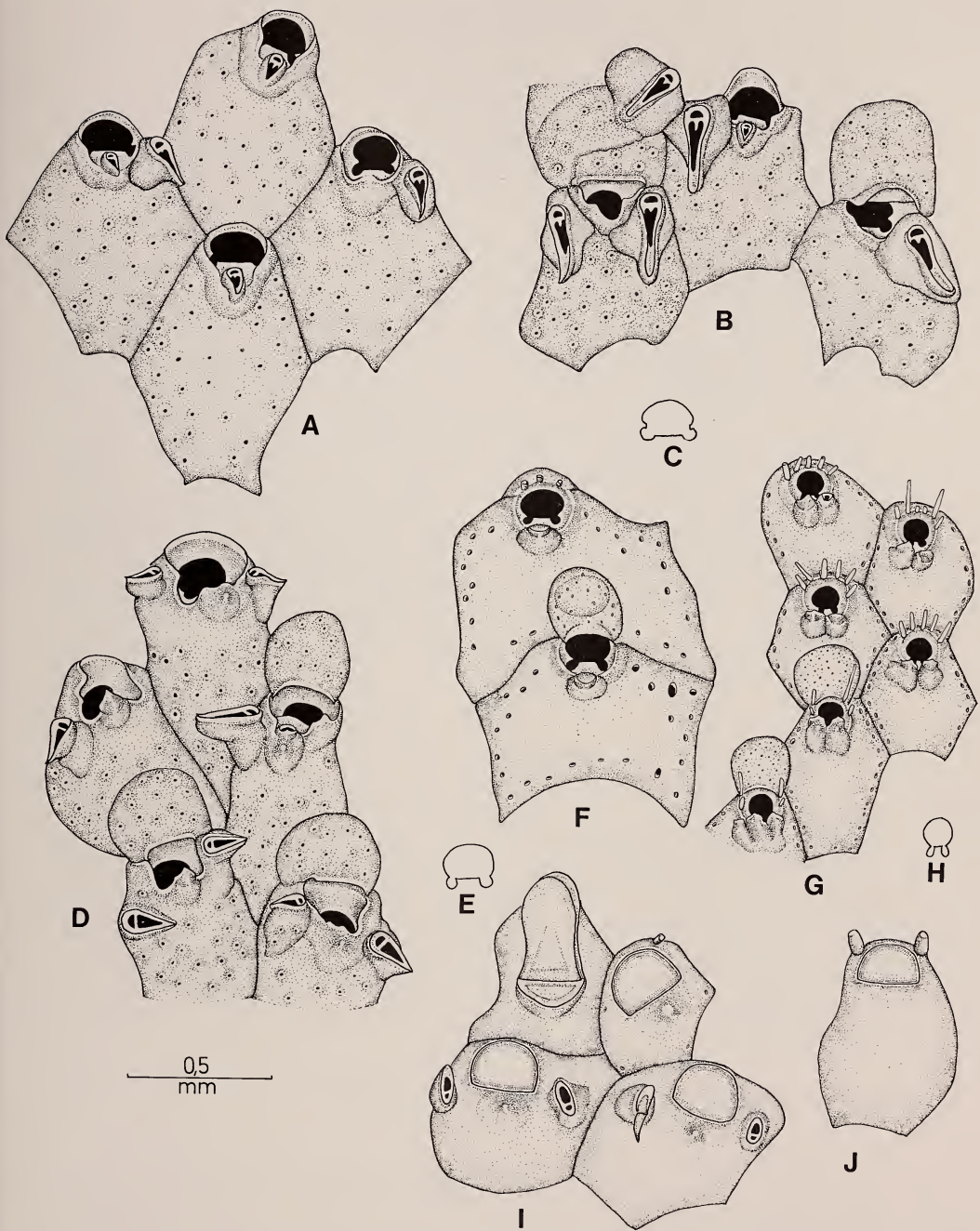

Fig. 15. A–C. *Smittina ferruginea* sp. nov. A. Zooids from the growing edge. B. Ovicelled zooids, with additional avicularia. C. Outline diagram of primary orifice. D–E. *Smittina sitella* sp. nov. D. A group of zooids, with ovicells and lateral avicularia. E. Outline diagram of primary orifice. F. *Smittoidea errata* sp. nov. G–H. *Smittoidea circumspecta* sp. nov. G. A group of zooids, with varying development of the suboral avicularia. H. Outline diagram of primary orifice. I–J. *Celleporaria capensis* (O'Donoghue & de Watteville). I. Three autozooids and a vicarious avicularium. J. A young zooid with oral spines intact.

Smittina ferruginea sp. nov.

Fig. 15A–C

Material

Holotype: SAM–A26426, station SM 239, 32°14,8′S 29°00,8′E, 90 m.

Description

Colony encrusting, multilaminar, forming broad irregular sheets. Zooids large, hexagonal, rather flat, separated by shallow grooves. Primary orifice subterminal, wider than long; lyrula broad and low, occupying greater part of proximal border, condyles short, quadrate, conspicuous. No oral spines. Peristome low, scarcely projecting above frontal surface of zooid; distal border formed from frontal calcification of succeeding zooid, incorporating proximally the cystid of a small, median suboral avicularium. Rostrum of avicularium triangular or semi-elliptical, partly enclosed within peristome, acute to frontal plane and directed proximally. Additional avicularia may be developed lateral to the peristome, single or paired; rostrum slender, elongate, straight or gently curved, typically directed proximally or obliquely proximally, rarely obliquely distal. Frontal wall finely granular, closely perforated by numerous round pores, each becoming immersed in a distinct pit as calcification continues. Ovicell hyperstomial, prominent, spherical, finely granular and regularly perforated by numerous small round pores; ectooecium forming a frontal lip continuous with the rim of the peristome.

Etymology

Ferruginus (L.)—rust-coloured.

Remarks

Several large well-grown colonies were collected from station SM 239, encrusting the living colony of *Aspidostoma livida*. The preserved material retained a dull purplish brown colour with scattered patches of deeper reddish brown. These patches corresponded to sites of active frontal budding, marking the development of new laminae, and the pigment was seen to be concentrated in the polypides of the young zooids, and in a narrow fringe around the undifferentiated growing edge of each lamina.

Measurements (means of 25 values) in mm

Lz	lz
0,87	0,58

Smittoidea Osburn, 1952

Smittoidea Osburn, 1952: 408. Hayward & Ryland, 1979: 108.

Smittoidea circumspecta sp. nov.

Fig. 15G–H

Material

Holotype: SAM–A26427, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 184, SM 185, SM 239.

Description

Colony encrusting, forming small round white patches. Zooids small, hexagonal, broad and convex, separated by deep grooves. Primary orifice longer than wide, distinctly narrowed proximally, with broad, basally deflected condyles; proximal border with a slender lyrula, fragile and frequently missing. Five or six slender closely spaced oral spines on the distal and lateral borders of the orifice; peristome scarcely developed, forming at the most a low lateral wall on each side. Suboral avicularium rarely single, typically twinned, frequently tripled or quadrupled; cystid short, cylindrical and erect, rostrum facing distally, perpendicular to frontal plane, mandible semicircular. The avicularian complex forms a two-, three-, or four-lobed digitate process immediately proximal to, and largely obscuring, the orifice. Frontal wall finely granular, with a single series of conspicuous marginal pores. Ovicell spherical, recumbent on succeeding zooid, with numerous small round pores.

Etymology

Circumspectus (L.)—guarded, an allusion to the oral avicularia.

Remarks

The elongate orifice, the closely spaced oral spines and the cluster of suboral avicularia impart a highly characteristic appearance to this species, which allows it to be readily distinguished from all other species of *Smittoidea*.

Measurements (means of 20 values) in mm

Lz	lz
0,46	0,37

Smittoidea errata sp. nov.

Fig. 15F

Smittoidea ?hexagonalis: Hayward & Cook, 1979: 89, fig. 12A–B.

Material

Holotype: SAM–A26428, station SM 163/164, 33°04,6′S 28°06,6′E, 90 m.
Other material: station SM 239.

Description

Colony encrusting. Zooids quadrate, flat or slightly convex, separated by distinct grooves. Primary orifice broader than long, with a short square lyrula occupying about half of the proximal border; condyles distinct, triangular, basally deflected. Three short distal oral spines present in newly budded zooids; peristome a low thickened rim enclosing orifice distally and laterally, proximally incorporating a small suboral avicularium. Mandible semicircular, acute to frontal plane, directed proximally. Occasionally replaced by an enlarged spatulate avicularium, directed proximolaterally (Hayward & Cook 1979). Frontal wall fine grained, with a series of marginal pores. Ovicell hyperstomial, recumbent on succeeding zooid; oval, thinly calcified, with about twenty small irregularly shaped frontal pores.

Etymology

Erratum (L.)—a mistake, referring to the previous misidentification of this species.

Remarks

The single specimen of this species collected from station SM 86 during the first *Meiring Naude* cruise (Hayward & Cook 1979) was erroneously ascribed to '*Smittina*' *hexagonalis* O'Donoghue 1924, which, in fact, lacks a suboral avicularium. Three small living colonies were present in the second collection, two of which were incubating embryos.

Measurements (means of 15 values) in mm

Lz	lz
0,67	0,51

Smittoidea calcarata sp. nov.

Fig. 16A–B

Material

Holotype: SAM–A26429, station SM 233, 32°15,2′S 29°09,8′E, 540–580 m.

Description

Colony encrusting, unilaminar, delicate and hyaline. Zooids flat and broad, irregularly polygonal, separated by shallow grooves. Primary orifice wider than long, proximal border with a tapered peg-like lyrula, condyles sharp, slender and conspicuous; distal border almost straight, two short distal oral spines visible in peripheral zooids, occluded by the development of succeeding zooids. Peristome short, erect, distal portion formed from the frontal calcification of the succeeding zooid, with a narrow, parallel-sided median fissure proximally. Avicularium situated immediately proximal to

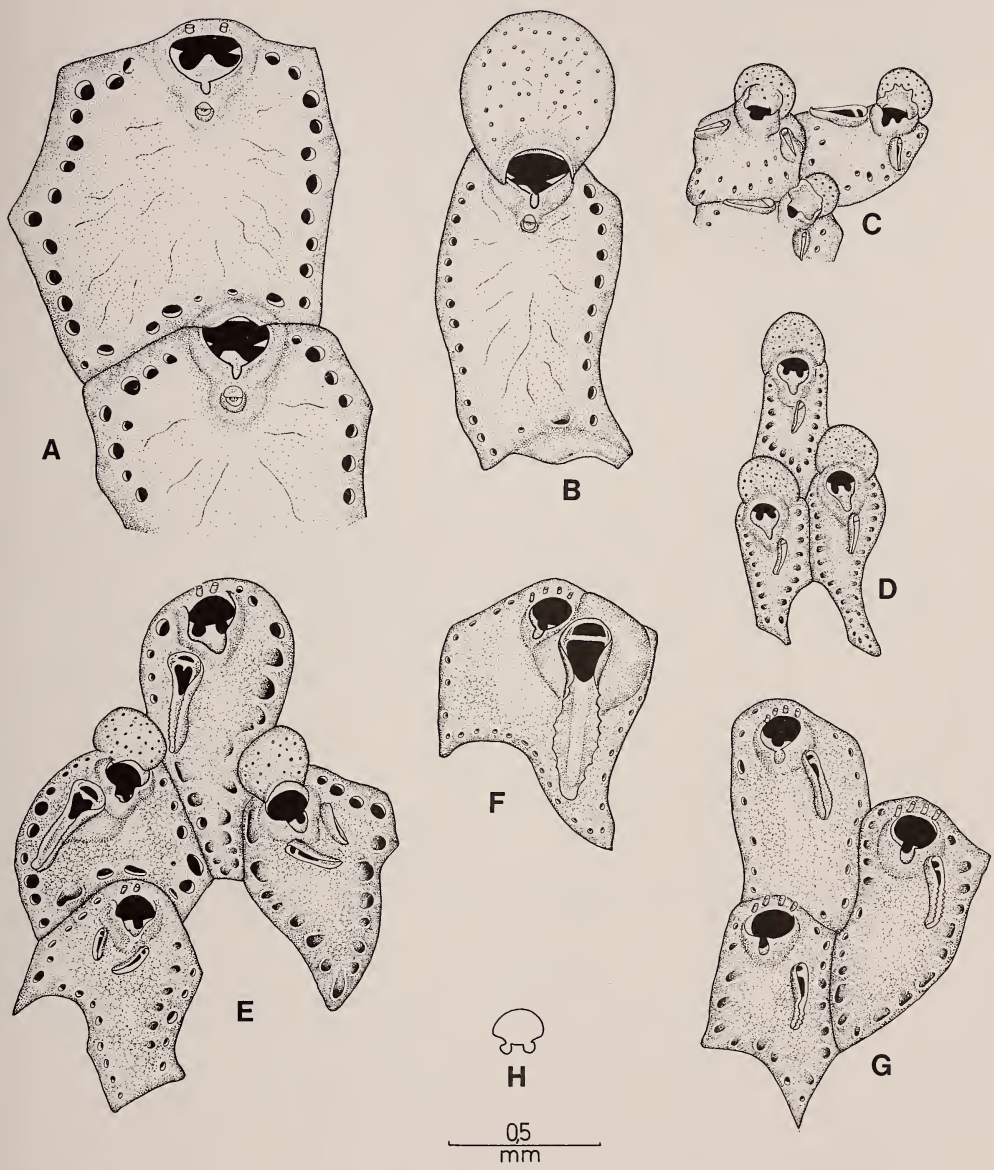

Fig. 16. A–B. *Smittoidea calcarata* sp. nov. A. Two zooids from close to the growing edge. B. An ovicelled zooid. C–D. *Parasmittina tropica* (Waters). C. Zooids with entire peristomes, showing different types of avicularia. D. Older zooids, with thickened peristomes. E–H. *Parasmittina novella* sp. nov. E. A group of zooids, with different types of avicularia. F. A zooid bearing an enlarged avicularium with flared serrate rostrum. G. Zooids with smaller avicularia, with serrate rostra. H. Outline diagram of primary orifice.

peristomial fissure, cystid low, rostrum elliptical, directed proximally, mandible semicircular. Frontal calcification thin, fine grained and sutured, with a single series of marginal pores. Ovicell oval, depressed frontally, developing a slight lip continuous with the zooid orifice; surface finely granular, with scattered, small, irregular pores.

Etymology

Calcar (L.)—a spur, referring to the sharp condyles within the primary orifice.

Remarks

A single large colony, measuring approximately 20 mm × 10 mm encrusting *Dimorphocella*, was collected from station SM 233.

Measurements (means of 15 values) in mm

Lz	lz
1,05	0,79

Parasmittina Osburn, 1952

Parasmittina Osburn, 1952: 411. Hayward & Ryland, 1979: 114.

Parasmittina tropica (Waters, 1909)

Fig. 16C–D

Smittia tropica Waters, 1909: 174, pl. 17 (figs 10–14).
Smittina tropica: Harmer, 1957: 934, pl. 64 (figs 23–28).
Parasmittina tropica: Cook, 1968: 215.

Material

Stations SM 163, SM 163/164, SM 164, SM 184, SM 185, SM 239.

Description

Colony encrusting. Zooids elongate, oval or irregular, rather flat. Primary orifice wider than long, a prominent quadrate lyrula occupying most of the proximal border, tapered distally to a greater or lesser extent; condyles large and conspicuous. Four short distal oral spines present in newly budded zooids. Peristome developing early in ontogeny, encircling primary orifice, and extending on to frontal surface of ovicell in fertile zooids; tubular, its edge variably lobed or produced. Proximomedially, the inner edge of the peristome develops a pair of longitudinal ridges delimiting a central channel, which in damaged specimens gives the illusion of a sinuate orifice. Frontal wall nodular, with a single series of large and distinct marginal pores. Adventitious avicularium arising laterally at base of peristome, directed proximally, laterally or medially, typically single, occasionally, paired; rostrum slender, elongate, up

to 0,15 mm long. Ovicell spherical, with numerous small pores; recumbent on succeeding zooid and eventually deriving an ooecial cover from it.

Remarks

Parasmittina tropica is readily distinguished from other species of this genus by the form of the peristome and by the characteristically slender avicularia. Some specimens included zooids bearing a second type of avicularium, broader proximally than the usual type (Fig. 16C), but as the latter frequently occurred on the same zooids also, this variation does not seem to be significant. The lyrula also varied greatly in width, but again such variation was observed within single colonies. In the structure of the peristome and the presence of slender parallel-sided avicularia all the numerous specimens here ascribed to *P. tropica* are closely similar.

Distribution

Described originally from the Red Sea coast of the Sudan (Waters 1909), this species has subsequently been reported from west Africa (Cook 1968) and the Mediterranean (Hayward 1974), and was accorded a wide distribution in the Indo-West-Pacific region by Harmer (1957). Soule & Soule (1973) have shown that some of Harmer's material comprises a distinct species, *P. serrula* Soule & Soule, and, consequently, the distribution of *P. tropica* may be more restricted than Harmer supposed.

Measurements (means of 20 values) in mm

Lz	lz
0,54	0,28

Parasmittina novella sp. nov.

Fig. 16E–H

Material

Holotype: SAM–A26430, station SM 239, 32°14,8′S 29°00,8′E, 90 m.

Description

Colony encrusting, multilaminar. Zooids oval, rectangular or irregular, convex, separated by shallow grooves. Primary orifice wider than long, lyrula short, anvil-shaped, occupying half width of proximal edge, condyles blunt, broad and conspicuous; two to four short, evanescent, distal oral spines, bases occluded by development of peristome. Distal portion of peristome developed from frontal calcification of succeeding zooid; prominent laterally and proximally, thin and erect, with a deep, parallel-sided medioproximal fissure; extending on to frontal surface of ovicell in fertile zooids, forming a complete ring. Free edge of peristome even or lobed. Frontal calcification at first smooth and hyaline, with a single series of small inconspicuous marginal pores; later

thicker and rather nodular. Avicularia lateral or proximolateral to peristome, single, paired or occasionally tripled, directed proximally; rostrum slender, parallel-sided and straight, or gently curved, up to 0,17 mm long, palate with a triangular foramen, pivotal bar thin, without a columella. In many, but not all, instances the distal edges of the rostrum are slightly flared and distinctly serrate (Fig. 16G). A larger avicularium may be developed on one side of the zooid, with an elongate, proximally directed rostrum up to 0,4 mm long; the rostrum is variably flared distally with fine or coarse serrations. Ovicell small, spherical, recumbent on distally succeeding zooid, surface finely granular, with numerous small pores.

Etymology

Novus (L.)—new.

Remarks

Parasmittina novella differs most markedly from *P. tropica* (Waters) and from the eastern Pacific *P. serrula* Soule & Soule in the size of its zooids; for the latter species Soule & Soule (1973) gave mean dimensions of Lz 0,368 mm, lz 0,284 mm, while the zooids of *P. novella* were 0,6–1,0 mm long and 0,38–0,6 mm wide. Although the two species are similar in possessing avicularia with flared serrate rostra, those of *P. serrula* seem to be less variable in all respects than those of *P. novella*. Both species resemble *P. tropica* in the form of the peristome, but in *P. novella* this is a far more delicate structure, lacking the proximal longitudinal thickening and sinuate appearance of Waters's species.

Measurements (means of 40 values) in mm

Lz	lz
0,74	0,44

Porella Gray, 1848

Porella Gray, 1848: 127, 148. Hayward & Ryland, 1979: 116.

Porella capensis O'Donoghue, 1924

Fig. 17A–B

Porella capensis O'Donoghue, 1924: 45, pl. 2 (fig. 14).

Material

Stations SM 163, SM 164, SM 239.

Remarks

Several small colonies of this species were found, occurring as irregular encrusting patches on organic calcareous substrata. The characteristic peristome clearly develops, as O'Donoghue (1924) described, as separate elements,

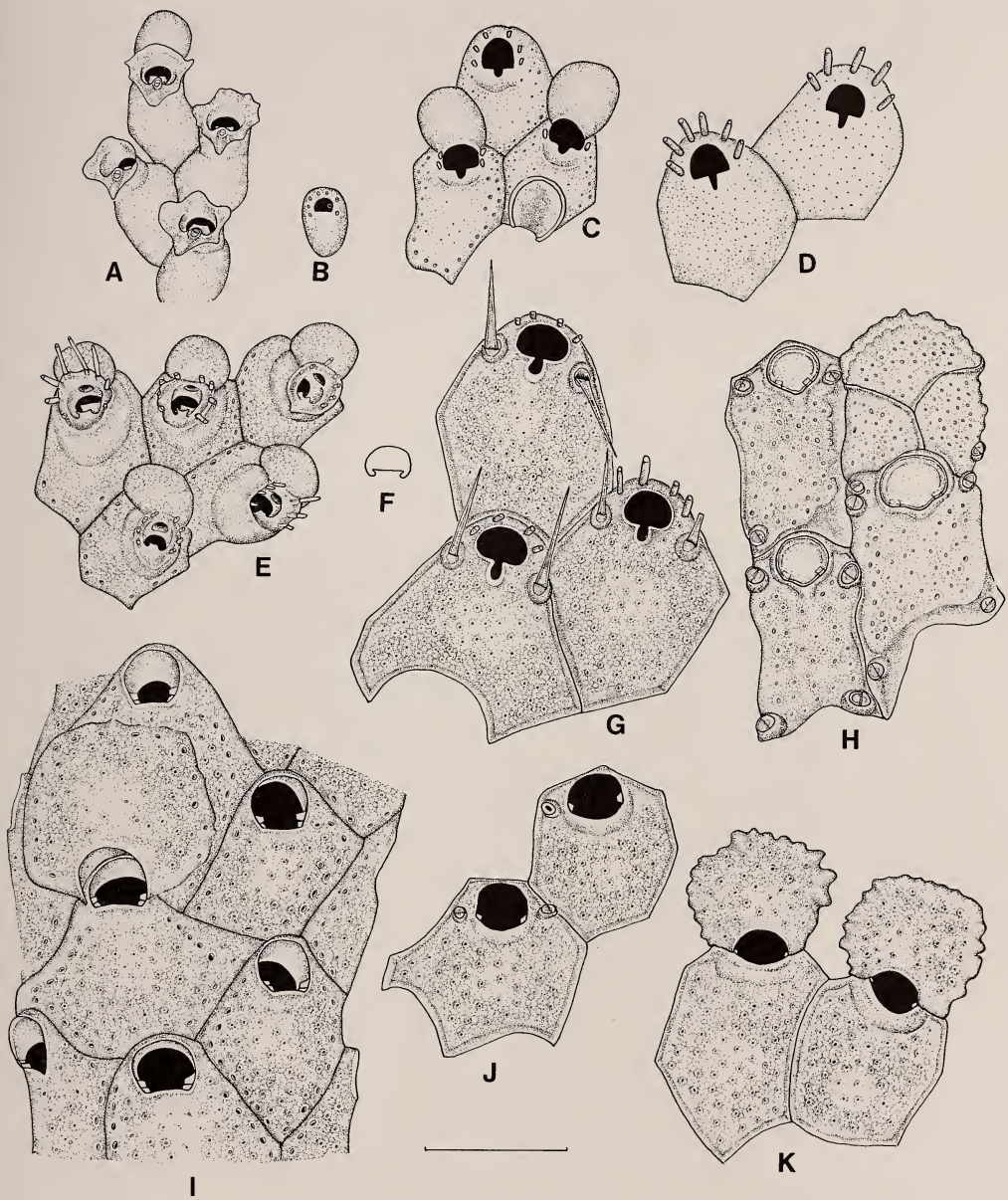

Fig. 17. A–B. *Porella capensis* O'Donoghue. A. Zooids with typical development of peristome; note the lyrula. B. The ancestrula. C. *Arthropoma circinatum* (MacGillivray). D. *Arthropoma* sp. E–F. *Escharella discors* sp. nov. E. Part of a colony, cleaned to show the lyrula below the peristomial denticle. F. Outline diagram of primary orifice. G. *Escharina waiparaensis* Brown. H. *Calyptotheca nivea* (Busk). I. *Emballotheca ambigua* sp. nov. J–K. *Calyptotheca porelliformis* (Waters). J. Two young zooids. K. Two ovicelled zooids. Scale = 0,5 mm for A–H, J–K; 1 mm for I.

a broad flared proximolateral portion and two distolateral portions. Small adventitious avicularia may occur on the distolateral parts of the peristome rim, but the specimens were too worn or damaged for further details to be observed. The lyrula, not described by O'Donoghue, is quadrate and quite distinct.

Family **Escharellidae** Levinsen, 1909

Escharellidae Levinsen, 1909: 314. Hayward & Ryland, 1979: 136.

Escharella Gray, 1848

Escharella Gray, 1848: 125, 148. Hayward & Ryland, 1979: 136.

Escharella discors sp. nov.

Fig. 17E–F

Material

Holotype: SAM–A26431, station SM 163/164, 33°04,6′S 28°06,6′E, 90 m.

Description

Colony encrusting, forming small irregular white patches. Zooids small, oval, convex, separated by deep grooves. Primary orifice wider than long, proximal border with a broad anvil-shaped lyrula occupying the whole of its width; encircled by a tall, thickened, cylindrical peristome, with eight slender spines disposed around its distal and lateral edges. Proximal edge of peristome peaked medially and bearing a bifurcate denticle on its inner face. Frontal wall thickly calcified, finely granular, marginal pores small and rather conspicuous. Ovicell spherical, tilted basally, the oval orifice opening into the top of the peristome.

Etymology

Discors (L.)—different.

Remarks

The morphology of the primary orifice and the number of oral spines are the most useful characters for distinguishing the different species of *Escharella*. *E. discors* has a further distinction in the large and conspicuous peristomial denticle, which in uncleaned specimens may be confused with the lyrula.

Measurements (means of 20 values) in mm

Lz	lz
0,51	0,31

Family **Petraliellidae** Harmer, 1957

Petraliellidae Harmer, 1957: 692.

The family includes a closely related group of genera, all of which are characterized by zooids with large orifices, and frontal shields with pseudopores

and marginal septula. Multiporous septula in the basal walls give rise to anchoring rhizoids; large distinctive, hyperstomial ovicells occur (see Cook & Chimonides 1981*a*).

Mucropetraliella Stach, 1936

Mucropetraliella Stach, 1936: 363, 372. Harmer, 1957: 709. Cook & Chimonides, 1981*a*: 118.

Characterized principally by the presence of a suboral complex consisting of a central lyrula and a mucro associated with an avicularium.

Mucropetraliella asymmetrica sp. nov.

Fig. 18

Material

Holotype: SAM–A26432, station SM 239, 32°14,8′S 29°00,8′E, 90 m.
Other material: stations SM 163, SM 164, SM 179, SM 180, SM 185.

Description

Colonies unilaminar, loosely encrusting, anchored by rhizoids originating from basal pore plates. Primary orifice wide, with two to three spines. Lyrula short and wide, sometimes extended laterally; lateral denticles pointing proximally. Lateral sinuses unequal and asymmetrical, the larger one occurring basally to the rostrum of the avicularium. Suboral mucro long and very stout; proximal part of the orifice and the frontal shield considerably raised. Suboral avicularium small, completely hidden at the base of the mucro, which is directed frontally and distally; rostrum curved, directed laterally, palate vertical to frontal plane, mandible rounded, hinged on a stout curved bar and directed medially. One or two pairs of small lateral oral avicularia present, also with rounded mandibles, directed laterally at an acute angle to frontal plane. In a few zooids other small rounded avicularia occur at the base of the mucro; one of the oral avicularia may be enlarged, with a conspicuous swollen cystid, the rostrum raised, with a serrated edge, elongate and slightly spatulate, often orientated proximally. Ovicells rather elongated, finely tuberculate, with one or two small frontal avicularia.

Etymology

Asymmetros (Gr.)—without symmetry, referring to the suboral sinuses.

Remarks

The lyrula and suboral avicularium are difficult to see as they are situated vertically below the mucro, which may reach a length of 1,2 mm and frequently obscures the orifice completely. *M. asymmetrica* closely resembles *M. watersi* Harmer (1957: 721, pl. 46 (fig. 9), fig. 67, from the East Indies), which was introduced for *Petralia vultur* var. *armata* Waters (1913: 518, pl. 70 (figs 15–20), from east Africa). Harmer noted that synonymy of the two species might be

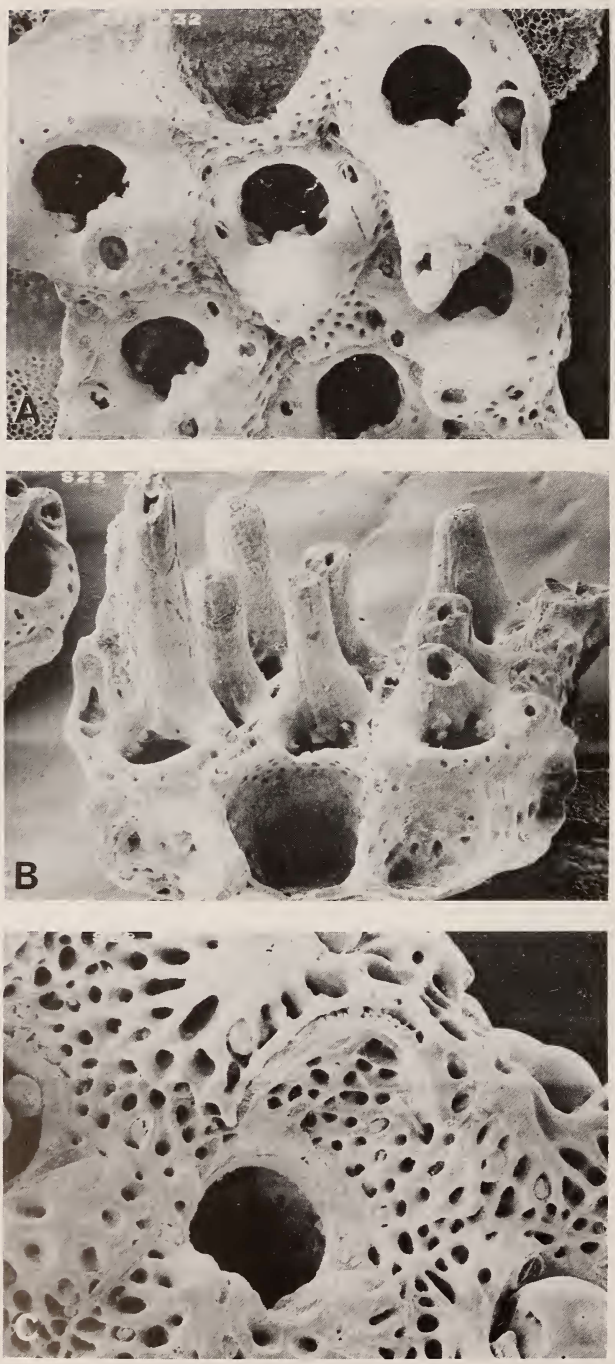

Fig. 18. *Mucropetraliella asymmetrica* sp. nov. A. A group of zooids in frontal view to show primary orifice and lateral avicularia. × 39. B. Fragment of a colony in distal view, showing elevation of the mucrones and associated avicularia. × 30. C. A developing ovicell. × 61.

doubted as Waters did not mention oral spines in his description. Comparison of the Siboga specimens described by Harmer (1957) with one from the coast of Kenya (BMNH 1975.4.16.5) shows them to be closely similar. The zooids of *M. watersi* are less robust than those of *M. asymmetrica* and somewhat smaller (Lz 0,85–1,0 mm, lz 0,55–0,65 mm, lor 0,24–0,31 mm); the primary orifice has four to six spines and symmetrical, equally developed lateral sinuses. The proximal part of the orifice is not greatly raised and the suboral complex is easily visible. Enlarged laterally or proximally directed avicularia are common and ovicells are generally as wide or wider than long (cf. Harmer 1957).

Although most of the specimens of *M. asymmetrica* are fragmentary and often worn, one colony from station SM 239, and another very young colony (with *Micropora similis*) on a lamellibranch shell from station SM 164 were alive when collected.

Measurements in mm

(range of 10 values)

Lz	lz	lor
0,85–1,30	0,60–0,90	0,30–0,42

(means of 3 values)

Lov	lov
0,55	0,52

Family **Schizoporellidae** Jullien, 1883

Schizoporellidae Jullien, 1883: 527. Hayward & Ryland, 1979: 166.

Arthropoma Levinsen, 1909

Arthropoma Levinsen, 1909: 332. Hayward & Ryland, 1979: 190.

Arthropoma cecilii (Audouin, 1826)

Flustra cecilii Audouin, 1826: 239, pl. 8 (fig. 3).
Schizoporella cecilii: O'Donoghue, 1924: 42.
Arthropoma cecilii: Hayward & Ryland, 1979: 190, fig. 79.

Material

Station SM 185.

Remarks

A single live colony of this species was found. *A cecilii* has a wide distribution in temperate, subtropical and tropical waters of the Atlantic, Indian and western Pacific oceans.

Arthropoma circinatum (MacGillivray, 1869)

Fig. 17C

Lepralia circinata MacGillivray, 1869: 134.
Arthropoma circinatum: Harmer, 1957: 1003, pl. 72 (figs 29–30). Powell, 1967: 256, text-figs 29–30.

Material

Station SM 163.

Description

Colony encrusting. Zooids hexagonal, convex, separated by deep grooves; 0,46–0,5 mm long by 0,34–0,4 mm broad. Primary orifice D-shaped, proximal border straight or slightly concave, with a short, quadrate median sinus. Six oral spines present. Frontal wall finely granular, with distinct marginal pores, extending towards the midline of the zooid proximolateral to orifice; elsewhere, minute scattered pores are occasionally visible in the frontal calcification. Peristome forming a slender crescentic lip proximal to the sinus, variably developed. Ovicell hyperstomial, prominent, spherical; surface finely granular, imperforate.

Remarks

A single dead colony was found, few of the zooids of which were completely undamaged. The morphological features of this specimen were very similar to those of specimens from New Zealand (BMNH 1899.5.1.1017) and Bass Strait (BMNH 1899.5.1.1018), although the New Zealand specimen has avicularia identical to those figured by Powell (1967, fig. 30) for '*A. circinatum* form B'. No complete avicularia were found in the *Meiring Naude* specimen, but a damaged zooid at the periphery of the colony bore a structure on the frontal wall which seemed to represent a developing 'form B' avicularium.

Distribution

Arthropoma circinatum seems to be widespread in the western Pacific, from New Zealand to Japan (Harmer 1957; Powell 1967), and has been reported from Tristan da Cunha (Busk 1884) and southern California (Osburn 1952). The record from Ceylon listed by Harmer (1957: 1004) is based on a specimen from the collection of L. R. Thornely that, on examination, proved to be a species of *Schizomavella*.

Arthropoma sp.
Fig. 17D

Material

Stations SM 163, SM 185.

Remarks

Very small colonies of this species were recovered from two stations. Although superficially similar to *A. cecilii*, the zooids differed in possessing five or six distal oral spines, and a smaller orifice with a more slender sinus. However, the material was fragmentary and none of the colonies represented a complete astogenetic series. Consequently, although its affinities with *Arthropoma* seem clear, this species must remain unnamed until further material is collected.

Escharina Milne Edwards, 1836

Escharina Milne Edwards, 1836: 230. Hayward & Ryland, 1979: 192.

Escharina pesanseris (Smitt, 1873)

Hippothoa pesanseris Smitt, 1873: 43, 76, pl. 7 (figs 159–160).
Escharina pesanseris: Harmer, 1957: 998, pl. 67 (figs 12–14, 18–19).

Material

Station SM 250.

Remarks

A single live colony of this distinctive species was collected; it is recognized by the characteristic duck-foot shape of the avicularian mandible (Harmer, 1957: pl. 67 (fig. 12)). *Escharina pesanseris* has been reported from numerous localities in the Caribbean, the subtropical-tropical Atlantic, and the Indo-West-Pacific region. It is known from Ceylon and Madagascar but does not seem to have been recorded before from South Africa.

Escharina waiparaensis Brown, 1952

Fig. 17G

Escharina waiparaensis Brown, 1952: 229, figs 163–165. Powell, 1967: 275, pl. 6 (fig. a), text-fig. 45.

Material

Stations SM 164, SM 239.

Description

Colony encrusting. Zooids broad and flat, rounded distally, separated by raised, compressed sutures. Primary orifice wider than long; anter semiorbicular, with a slightly convex proximal border, poster slender, slit-like, broadening proximally. Four short distal oral spines present. Frontal wall coarsely granular, perforated by numerous closely spaced, minute pores. Avicularia paired, lateral to orifice, level with the sinus; cystid small and rounded, supporting an elongate, distally directed, setiform mandible. Ovicells were not found. Numerous small basal pore chambers present.

Remarks

E. waiparaensis was described by Brown (1952) from the Miocene and Pliocene of New Zealand; recent specimens were reported by Powell (1967) from Three Kings Islands, northern New Zealand. Brown's material lacked spines, but Powell described two distal oral spines and two lateral 'eminences', possibly representing thickened spine bases. The *Meiring Naude* material, which included several living colonies, had four lightly calcified oral spines in the youngest zooids, but the ontogenetically earliest zooids lacked spines

altogether. In all respects the present material was identical with Powell's specimens from Three Kings Islands (BMNH 1964.8.12.59C, 59D).

Measurements (means of 20 values) in mm

Lz	lz
0,72	0,63

Calyptotheca Harmer, 1957

Calyptotheca Harmer, 1957: 1008.

Calyptotheca nivea (Busk, 1884)

Fig. 17H

Schizoporella nivea Busk, 1884: 163, pl. 17 (fig. 1). Marcus, 1922: 25, fig. 15.
Schizoporella tenuis: O'Donoghue & De Watteville, 1935: 214.
Emballotheca nivea: O'Donoghue & De Watteville, 1944: 424. O' Donoghue, 1957: 87.

Material

Stations SM 163, SM 163/164, SM 164, SM 179, SM 185, SM 232.

Description

Colony encrusting, multilaminar. Zooids quadrate, broad, flat or slightly convex, separated by distinct raised sutures; 0,5–0,8 mm long by 0,38–0,52 mm broad. Primary orifice subterminal, orbicular, as wide as long, or slightly wider than long; poster forming a shallow U-shaped sinus below conspicuous quadrate lateral condyles. Frontal wall regularly and closely perforated by numerous round pores, each in a shallow pit, giving a rugose appearance. Avicularia adventitious, small, typically paired, situated lateral to orifice, close to suture of zooid; mandible semi-elliptical, short, variably orientated. Ovicell hyperstomial, closed by zooidal operculum; oval, flattened frontally, regularly perforated and typically crossed by sutures. Orifice of ovicelled zooid broader than that of non-fertile zooid, with a wider and more shallow sinus.

The shape of the primary orifice showed some variation between the different specimens, and earlier astogenetic stages tended to have a more narrow sinus. In the colony from station SM 185 the zooids had developed short cylindrical umbones proximal to the orifice, like those of the specimen figured by Marcus (1922). The small avicularia are often very numerous, but tend to be distributed along the interzooidal sutures.

Distribution

Calyptotheca nivea seems to be known only from the southern and eastern coasts of South Africa. Reports of its occurrence elsewhere in the Indo-West-Pacific region have been shown by Harmer (1957) to be attributable to other species of *Calyptotheca*.

Calyptotheca porelliformis (Waters, 1918)

Fig. 17J–K

Schizoporella porelliformis Waters, 1918: 15 (footnote), pl. 2 (figs 19–21).
Calyptotheca porelliformis: Harmer, 1957: 1008, 1020.

Material

Stations SM 163, SM 185.

Description

Colony encrusting, multilaminar. Zooids broad, quadrate, flat or slightly convex, separated by distinct raised sutures; 0,56–0,76 mm long by 0,4–0,6 mm broad. Primary orifice as broad as long, anter and poster of equivalent length; anter D-shaped, poster shallowly concave, condyles prominent, blunt and downcurved. Frontal wall rugose, regularly and closely punctured by numerous round pores, each in a pit; a low, nodular ridge develops around proximal half of orifice. Avicularia adventitious, minute, oval, with semi-elliptical mandible; infrequent, situated lateral to orifice, close to sutures, single or paired, but often absent altogether. Ovicell recumbent on succeeding zooid, hyperstomial, closed by zooidal operculum; oval, flat frontally, closely punctured and very rugose. Anter of ovicelled zooids much shorter than that of non-ovicelled zooids.

Distribution

This species does not seem to have been reported since its original description by Waters (1918) from Port Elizabeth.

Emballotheca Levinsen, 1909

Emballotheca Levinsen, 1909: 89, 333. Harmer, 1957: 1086.

Emballotheca ambigua sp. nov.

Fig. 17I

Material

Holotype: SAM–A26433, station SM 250, 31°59,3′S 29°22,5′E, 150–200 m.

Description

Colony erect, dichotomously branching; branches cylindrical, somewhat uneven or curved, about 2,5 mm thick, composed of whorls of four zooids. Zooids large and broad, convex, separated by faint sutures. Frontal calcification thick, finely granular, with numerous small closely spaced pores and a single series of more distinct marginal pores. A conspicuous thick light brown epitheca present. Primary orifice broader than long; anter approximately semicircular, poster forming a shallow semi-elliptical trough between short

blunt lateral condyles. In fully developed, undamaged zooids the condyles appear twinned (Fig. 17I). Ovicell very large, immersed and scarcely protruding from branch surface, obscuring most of the distally succeeding zooid, but not disturbing the four-whorled arrangement; orifice of ovicelled zooid enlarged, more nearly quadrate, with the poster considerably broadened.

Etymology

Ambiguus (L.)—uncertain, referring to the systematic placing of the species.

Remarks

The material comprised two fragments, each 15 mm long; both were living when collected and perhaps represent parts of a single colony. The very large ovicells, dimorphic orifices and prominent condyles of this species suggest it is allied to the species of *Emballotheca* described by Harmer (1957). However, it should be noted that the distinction between this genus and *Calyptotheca* Harmer is unclear (see Dumont 1981), and the systematic placing of *E. ambigua* must, therefore, be regarded as tentative.

Measurements (means of 20 values) in mm

Lz	Lor	lor
1,42	0,35	0,36

Family **Stomachetosellidae** Canu & Bassler, 1917

Stomachetosellidae Canu & Bassler, 1917: 44. Hayward & Ryland, 1979: 208.

Stomachetosella Canu & Bassler, 1917

Stomachetosella Canu & Bassler, 1917: 45. Hayward & Ryland, 1979: 208.

Stomachetosella balani (O'Donoghue & De Watteville, 1944)

Schizoporella balani O'Donoghue & De Watteville, 1944: 426, pl. 16 (figs 15–16).
Stomachetosella balani: O'Donoghue, 1957: 87.
Schizoporella balani: Hayward, 1980: 705, fig. 3G.

Material

Station SM 185.

Remarks

This characteristic South African species was recently redescribed and figured by Hayward (1980). Its affinities with the boreal Atlantic species currently assigned to *Stomachetosella* seem doubtful, and the relationship of all Recent species to the type species, *S. crassicollis* Canu & Bassler, requires re-examination. *S. balani* appears more similar to the Philippine species, *Schizoporella perforata* Canu & Bassler (1929: 318), than to other species of *Stomachetosella*.

Family **Cleidochasmatidae** Cheetham & Sandberg, 1964

Cleidochasmatidae Cheetham & Sandberg, 1964: 1032.

Systematic problems involving species within this family are reviewed on p. 104.

Cleidochasma Harmer, 1957

Cleidochasma Harmer, 1957: 1032. Cook, 1964*b*: 11.

Cleidochasma porcellanum (Busk, 1860)

Lepralia porcellana Busk, 1860: 283, pl. 31 (fig. 3).
Cleidochasma porcellanum: Cook, 1964*b*: 11, pl. 1 (fig. 4), pl. 2 (figs 1–2), fig. 4A–E.

Material

Station SM 163.

Description

Colony encrusting, zooids with imperforate, semi-transparent porcellanous frontal shields and four small marginal septula. Orifice rounded distally, with a small rounded sinus delineated by large proximally directed condyles. Avicularia small, often paired, lateral and suboral, mandible rounded or subtriangular, directed laterally; if not present, avicularium replaced by one of the marginal septula. Ovicells hyaline and prominent at first, hyperstomial, not closed by the operculum, becoming partially immersed. Proximal edge of ovicell with paired lateral indentations and an area of thin calcification.

Remarks

A single, fairly large colony, comprising approximately 1 250 zooids, was found. It was alive when collected, and includes a well-preserved growing edge. The earlier stages of colony growth are obscured by small groups of frontally budded zooids. The orifice is more elongated than those of east African specimens (BMNH 1976.7.20.7, Wasin, Zanzibar) and of the west African specimens illustrated by Cook (1964*b*).

C. porcellanum is a widely distributed and very variable species-complex which includes *C. bassleri* (Calvet), as described by Harmer (1957). Records are circumtropical and subtropical, with a depth range of 1–220 m.

Cleidochasma protrusum (Thornely, 1905)

Gemellipora protrusa Thornely, 1905: 119, pl. 7.
Cleidochasma protrusum: Harmer, 1957: 1040, pl. 71 (figs 1–4), fig. 112. Hayward & Cook, 1979: 89.

Material

Station SM 131.

Remarks

A single, small dead colony was found. The characteristic morphotype of the South African populations of *C. protrusum* was noted by Hayward & Cook (1979).

Cleidochasma cribritheca (Busk, 1884)

Fig. 19A

Gemellipora cribritheca Busk, 1884: 176, pl. 33 (fig. 5).

Material

Stations SM 163, SM 163/164, SM 164.

Description

Colony encrusting, unilaminar, appearing white and porcellanous. Zooids oval to hexagonal, convex, separated by shallow grooves; 0,4–0,6 mm long by 0,2–0,3 mm broad. Primary orifice longer than wide, anter suborbicular, poster elongate, V-shaped; condyles prominent, proximally directed. Orifice becoming immersed as calcification thickens, but without a defined peristome; no oral spines. Frontal wall at first smooth, with numerous small frontal pores; becoming more rugose in later ontogenetic stages, with pores sunk in small pits. Avicularium single, proximal to sinus, on a small tumid cystid; mandible semi-elliptical or semicircular, directed proximally. Ovicell recumbent on succeeding zooid, oval, flattened frontally and perforated by numerous small pores; later enveloped distally and laterally by a thickened ooecial cover.

A colony from SM 163 (Fig. 19A) included early astogenetic stages. These were partly obscured by later zooids but showed clearly two small zooids, each with numerous small oral spines. These may represent a twinned ancestrula; alternatively, the ancestrula may be obscured by the two largest zooids and the small zooids may be simply the first to be budded from the ancestrula.

Distribution

This species is known only from South African waters.

Cleidochasma perspicua sp. nov.

Fig. 19B

Material

Holotype: SAM–A26434, station SM 163, 33°04,6′S 28°06,6′E, 90 m.

Description

Colony encrusting. Zooids hexagonal, convex, separated by shallow grooves. Primary orifice cleithridiate: anter orbicular, poster wider than long, V-shaped, condyles large and distinct, blunt, basally deflected. Peristome

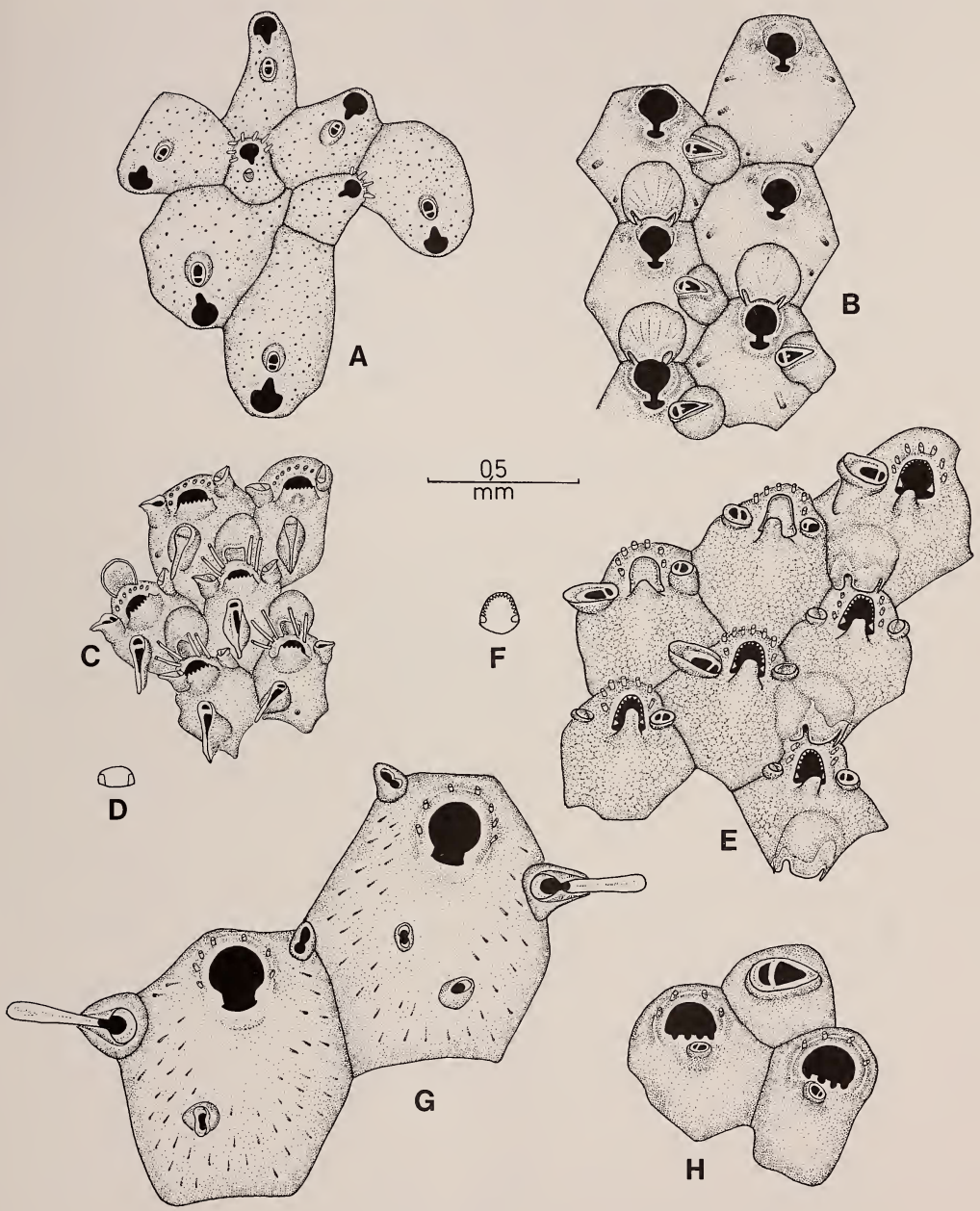

Fig. 19. A. *Cleidochasma cribritheca* (Busk). B. *Cleidochasma perspicua* sp. nov. C–D. *Hippoporella spinigera* (Philipps). C. Portion of a young colony. D. Outline diagram of primary orifice. E–F. *Hippoporella labiata* sp. nov. E. Portion of a young colony. F. Outline diagram of primary orifice. G. *Hippomenella avicularis* (Livingstone). H. *Celleporaria tridenticulata* (Busk).

developed as a low rim distally and laterally, frequently with two or more short umbones laterally; a third small umbo may be developed proximal to the orifice. Frontal wall thick, vitreous, smooth, with very few sparsely distributed and indistinct marginal pores; thick, translucent secondary calcification infills the grooves between zooids in later ontogenetic stages, pore openings migrate medially as this encroaches and the passage of the pore appears tubular (Fig. 19B). Avicularium adventitious, single, proximolateral to orifice; cystid tumid, rostrum slender, acute triangular, directed obliquely laterally, palate with a triangular foramen, cross-bar stout with a thickened, quadrate columella. The avicularia are sporadically developed, frequently missing from many zooids. Ovicell recumbent on succeeding zooid, as wide as long, flattened frontally and with a distinct labellum; calcification smooth and imperforate, developing a small median umbo. Large basal pore chambers present.

Etymology

Perspicuus (L.)—transparent, an allusion to the frontal calcification.

Remarks

The holotype comprises a single unilaminar colony, 5 mm^2 in area. It was alive when collected and many of the ovicells contained embryos. *C. perspicua* is most similar to *C. porcellanum* (Busk), which appears to have a circumtropical distribution. In particular, the primary orifice of this species is very similar to that of a variant of *C. porcellanum* from Ceylon, illustrated by Cook (1964*b*, text-fig. 4). However, the large tumid avicularian cystids and the conspicuous frontal labellum of the ovicell are sufficient to distinguish *C. perspicua* from other species of *Cleidochasma*. For further discussion of this species see p. 104.

Measurements (means of 20 values) in mm

Lz	lz
0,45	0,4

Hippoporidra Canu & Bassler, 1927

Hippoporidra Canu & Bassler 1927: 21, 31. Cook, 1964*b*: 22. Taylor & Cook, 1981: 244.

Hippoporidra senegambiensis (Carter, 1882)

Cellepora senegambiensis Carter, 1882: 416, pl. 16 (fig. 1A–V).
Hippoporidra senegambiensis: Cook, 1964*b*: 29, pl. 3 (figs 3–4), figs 7B–C, 8A–D; 1968: 196, 4pl. 8 (fig. C).

Material

Station SM 185, one young colony on *Turritigera* shell.

Description

Colonies encrusting gastropod shells, usually those inhabited by pagurid crabs. Zooids multilamellar, produced by frontal budding, with two to four

series of frontal marginal septula and orifices with rounded sinus and distinct condyles. Colony becoming mamillate by budding of groups of prominent, large (?male) zooids with small orifices and tuberculate peristomes. Interzooidal and adventitious avicularia triangular or rounded. Ovicelled zooids occurring in hollows among the mamillae, ovicells with a small frontal area.

Remarks

H. senegambiensis is common in west African waters, to a depth of 100 m. The single specimen found, which encrusts a small *Turritigera* shell 10 mm in length, is a young colony without ovicells that was alive when collected. Another species of *Hippoporidra*, *H. picardi*, has been reported from South Africa from depths of 45 to 200 m. *H. picardi* has larger, more recumbent zooids, with orifices having a small rounded sinus.

Hippoporella Canu, 1917

Hippoporella Canu, 1917: 36. Harmer, 1957: 1096. Hayward & Ryland, 1979: 218.

Hippoporella spinigera (Philipps, 1899)

Fig. 19C–D

Escharoides spinigera Philipps, 1899: 440, 448, pl. 43 (fig. 12).
Hippoporella spinigera: Harmer, 1957: 1100, pl. 73 (fig. 13).
Mucronella serratilabris O'Donoghue, 1924: 48, pl. 3 (fig. 18).

Material

Stations SM 131, SM 151, SM 163, SM 164, SM 250.

Description

Colony encrusting, forming small circular, silvery patches. Zooids oval to hexagonal, small and rather broad; separated by shallow grooves, later obscured by calcification. Primary orifice broader than long, appearing rather quadrate; distal edge arched, proximal edge almost straight, blunt lateral condyles present. Seven long, slender, closely grouped distal oral spines. Peristome developed proximally as a blunt, prominent mucro, with a broad, quadrate, finely serrated lip on its distal edge. Adventitious avicularia paired, lateral to orifice; mandible acute triangular, directed laterally or distolaterally. Additional avicularia present on frontal wall: most frequently elongate, situated on midline of zooid, with slender triangular mandible directed proximally; more rarely, one or two avicularia, similar to oral type but slightly larger, situated elsewhere on frontal wall, with variable orientation. Frontal wall smooth, imperforate except for inconspicuous marginal pores. Basal pore chambers present. Ovicell hyperstomial, recumbent on succeeding zooid, spherical, with a large quadrate orifice, often developing a small umbo.

Remarks

H. spinigera is characterized by the small size of its zooids, the distinctive peristomial mucro and the closely grouped slender oral spines. Originally described fom the Loyalty Islands (Philipps 1899), it has since been reported from Hong Kong, the Philippines, and Sumbawa (Harmer 1957), and a single specimen was recorded from South Africa by O'Donoghue (1924), as *Mucronella serratilabris*. Some Australian Tertiary species such as *Mucronella mooraboolensis* MacGillivray (1895: 100, pl. 13 (fig. 9)) and *Rhynchopora spinifera* MacGillivray (1895: 102, pl. 13 (fig. 19)) may be related to *H. spinigera*.

Measurements (means of 10 values) in mm

Lz	lz
0,32	0,27

Hippoporella labiata sp. nov.

Fig. 19E–F

Material

Holotype: SAM–A26435, station SM 250, 31°59,3′S 29°22,5′E, 150–200 m.

Description

Colony encrusting. Zooids hexagonal, convex, small; separated by distinct grooves. Primary orifice lepralioid: anter longer than wide, with a finely denticulate edge, proximal border of poster gently concave; prominent, blunt lateral condyles present. Seven or eight short oral spines closely spaced around distal border of aperture. Frontal wall thick, vitreous, with a nodulated surface, imperforate except for indistinct marginal pores; a short cylindrical umbo developing just proximal to orifice and arching towards it. Avicularia adventitious, situated lateral to orifice, typically paired, mandible semi-elliptical, directed obliquely laterally; often replaced on one or both sides by a second type with an elongate, parallel-sided, distally-rounded mandible. Ovicell hyperstomial, pyriform, imperforate, with a distinct frontal labellum; becoming submerged in secondary calcification derived from distally succeeding zooids. Small basal pore chambers present.

Etymology

Labiatus (L.)—lipped, referring to the prominent suboral umbo.

Remarks

This species has a remarkable superficial resemblance to *H. multidentata* (Thornely), from Ceylon, described and figured by Harmer (1957: 1099, pl. 73 (figs 9–12)). Comparison of the present material with Thornely's type

specimen (BMNH 1906.12.3.4) shows several important differences. The orifice of *H. labiata* is proportionately less broad than in *H. multidentata*; the ovicell is longer and more distinctly pyriform than the rather squat ovicell of *H. multidentata*. Finally, the avicularia of *H. labiata* are very much larger than those of *H. multidentata* which, moreover, are consistently monomorphic. The systematic status of this species is considered at greater length on p. 104.

Measurements (means of 20 values) in mm

Lz	lz
0,45	0,39

Hippomenella Canu & Bassler, 1917

Hippomenella Canu & Bassler, 1917: 41. Brown, 1949: 513.

Hippomenella avicularis (Livingstone, 1926)

Fig. 19G

Lepralia tuberculata var. *avicularis* Livingstone, 1926: 93, pl. 5 (figs 1–3).
Hippomenella spatulata Harmer, 1957: 1095, pl. 72 (figs 27, 31).

Material

Stations SM 131, SM 163.

Description

Colony encrusting. Zooids large, oval, convex, separated by deep grooves. Primary orifice with a semi-orbicular anter separated from a narrower U shaped poster by prominent, blunt, basally deflected condyles. Orifice rim with six or seven spine bases. Frontal calcification thick and smooth, with numerous, very small inconspicuous pores; these are distributed around the periphery of the zooid, their frontal openings tend to shift centripetally as the frontal calcification thickens (giving a striated appearance to the wall), but the central area remains imperforate. Small adventitious avicularia present on all zooids, lateral to orifice and typically paired, mandible semi-elliptical, disto-laterally directed. Identical avicularia sporadically present frontally, up to five on a single zooid, orientation variable but directed away from the central area of the zooid. One or both of the lateral-oral pair may be replaced by an elongate avicularium with a slender spoon-like mandible. Small basal pore chambers present.

Remarks

This species was represented by several small dead colonies; ovicells were present but were so badly damaged that their structure could not be discerned.

Distribution

H. avicularis has been rarely reported and appears to be known from just three localities in the western Pacific (Harmer 1957).

Measurements (means of 16 values) in mm

Lz	lz
0,92	0,72

Family **Microporellidae** Hincks, 1879

Microporellidae Hinks, 1879: 156. Hayward & Ryland, 1979: 220.

Microporella Hincks, 1877

Microporella Hincks, 1877: 526. Hayward & Ryland, 1979: 220.

Microporella sp.

Fig. 20A

Material

Stations SM 163/164, SM 239.

Description

Colony encrusting. Zooids oval to hexagonal, broad, flat or slightly convex, separated by shallow grooves. Primary orifice subterminal, semicircular, with four or five short, distal oral spines. Frontal wall finely granular, perforated by numerous small pores; ascopore situated just proximal to orifice in distal third of zooid. Avicularium single, developed midway along the length of the zooid; mandible slender, setiform, up to 0,2 mm long, directed obliquely distally. No ovicells present.

Remarks

The familiar *Microporella ciliata* appears to have an almost cosmopolitan distribution, but the degree of morphological variation which it displays over its entire geographical range requires examination. The present material, consisting of two small colonies, is similar to *M. ciliata*, but in comparison with specimens from British waters appears rather larger, with more robust avicularian mandibles. No complete astogenetic series was represented in the *Meiring Naude* specimens, and neither colony possessed ovicells. consequently, the material is left unnamed until better specimens should be collected.

Measurements (means of 20 values) in mm

Lz	lz
0,57	0,42

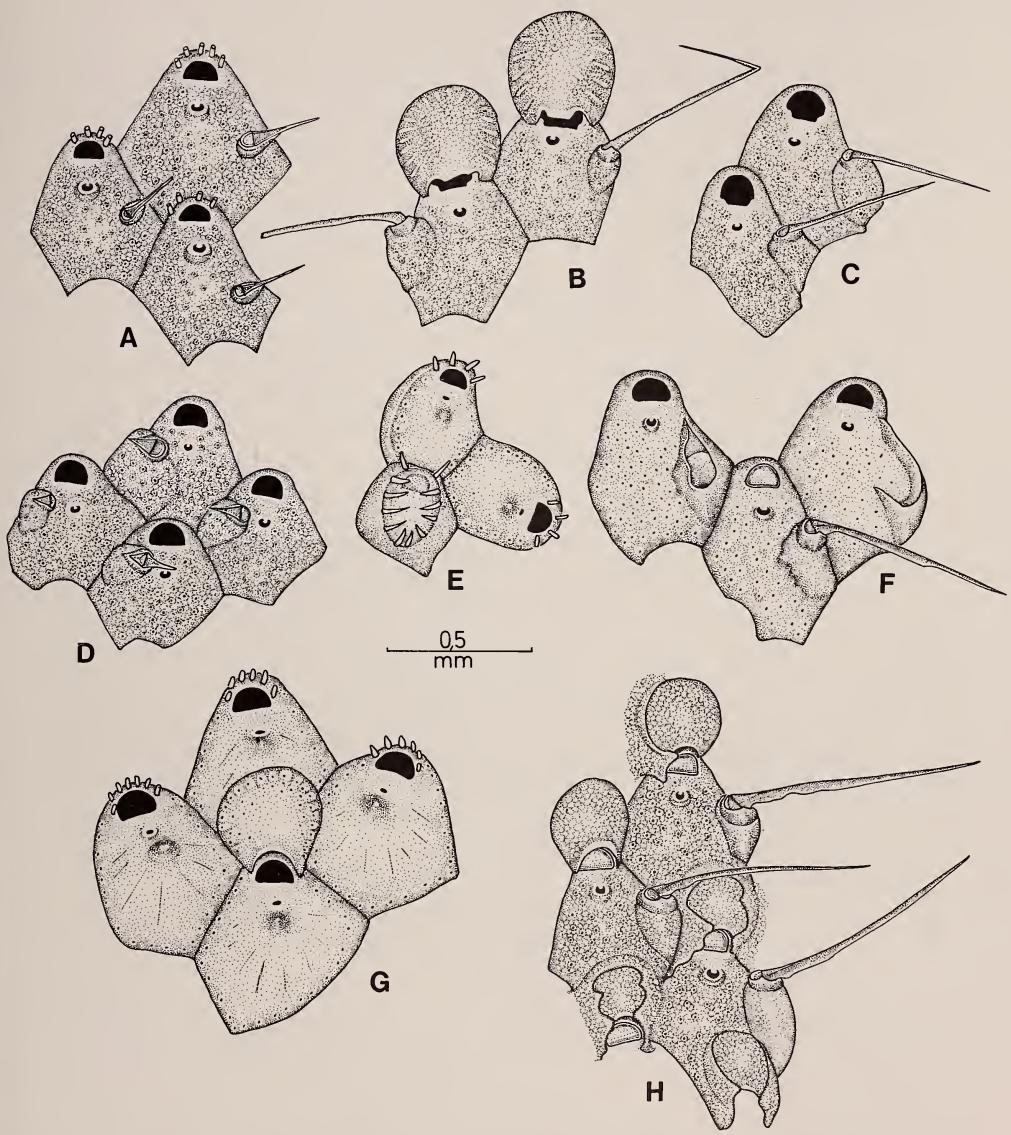

Fig. 20. A. *Microporella* sp. B–C. *Flustramorpha marginata* (Krauss). B. Ovicelled zooids. C. Young zooids, showing shape of primary orifice. D. *Flustramorpha flabellaris* (Busk). E. *Fenestrulina indigena* sp. nov., ancestrula and first two zooids. F. *Flustramorpha angusta* Hayward & Cook, young zooids showing shape of primary orifice. G. *Fenestrulina indigena* sp. nov., a group of zooids from close to the colony edge. H. *Flustramorpha angusta* Hayward & Cook, ovicelled zooids.

Flustramorpha Gray, 1872

Flustramorpha Gray, 1872: 168. Busk, 1884: 135.

All three species of *Flustramorpha* known from South Africa were present in the *Meiring Naude* samples. The genus is a homogenous one and the three species are often difficult to distinguish; it seems useful, therefore, to describe briefly the features considered here to be of importance. *F. flabellaris* (Busk) typically develops a tufted colony of short, broad lobes, but its most distinctive feature is the avicularium that, unlike those of the other two species, has a short acuminate mandible, and a palate that is almost parallel to the frontal plane of the zooid. In *F. marginata* (Krauss) and *F. angusta* Hayward & Cook the avicularium has a setiform mandible, and the palate is orientated at an oblique, or even perpendicular, angle to the frontal plane.

The avicularian mandibles of *F. angusta* were not preserved in the type specimen. They are similar to those of *F. marginata*, setiform and up to 0,75 mm long; they are broadened basally close to the point of articulation (Fig. 20H). The ovicell of *F. angusta* is proportionately smaller, narrower and more depressed than that of *F. marginata*, its width being considerably less than that of the maternal zooid. Further, whereas in *F. marginata* the ovicell is prominent at all stages of growth, in *F. angusta* it is progressively obscured by secondary calcification which typically overhangs its aperture on each side. The orifice of *F. angusta* is semi-elliptical, with a straight proximal border (Fig. 20F), whereas that of *F. marginata* has distinct lateral condyles that impart to it a characteristic outline at all ontogenetic stages (Fig. 20C).

Finally, it may be the case that the colony form of these latter two species are a further useful specific character. The specimens of *F. angusta* were all slender, unbranched, strap-like colonies, up to 50 mm long, with a maximum width of 3,5 mm. The material of *F. marginata* was mostly fragmentary, but included two regularly bifurcating colonies, 30 mm and 40 mm high, with a maximum branch width of 4 mm.

Flustramorpha flabellaris (Busk, 1854)

Fig. 20D

Eschara flabellaris Busk, 1854: 91, pl. 107 (figs 7–10).
Microporella flabellaris: Marcus, 1922: 28, fig. 16.

Material

Stations SM 179, SM 180.

Flustramorpha marginata (Krauss, 1837)

Fig. 20B–C

Flustra marginata Krauss, 1837: 35, fig. 3.
Flustramorpha marginata: Busk, 1884: 135, pl. 20 (fig. 8). Hayward & Cook, 1979: 80.

Material

Stations SM 163/164, SM 184, SM 185, SM 239.

Flustramorpha angusta Hayward & Cook, 1979

Fig. 20F, H

Flustramorpha angusta Hayward & Cook, 1979: 80, fig. 11E.

Material

Stations SM 131, SM 163, SM 163/164, SM 184, SM 185.

Fenestrulina Jullien, 1888

Fenestrulina Jullien, 1888: 37. Hayward & Ryland, 1979: 224.

Fenestrulina indigena sp. nov.

Fig. 20E–G

Material

Holotype: SAM–A26436, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: station SM 163/164.

Description

Colony encrusting. Zooids oval to hexagonal, convex, separated by distinct grooves. Primary orifice semicircular, with a thin raised rim, relatively small—constituting less than one-tenth of the total zooid length; six or seven short distal oral spines present. Frontal wall thin and hyaline, with a few radiating sutures; marginal pores distributed in a single series, small and rather inconspicuous. Ascopore situated just proximal to orifice in the distal half of the zooid, small, transversely oval; a short umbo develops proximal to the ascopore but does not support it. Ovicell recumbent on succeeding zooid, globular, as wide as long; smooth surfaced, with faint marginal flutings. Ancestrula tatiform, oval, 0,32 mm long, with twelve marginal spines.

Etymology

Indigenus (L.)—native to.

Remarks

Fenestrulina indigena may be distinguished from other species of the genus by the number of oral spines, and by the characteristic frontal umbo, which does not seem to be in any way associated with the ascopore.

Measurements (means of 20 values) in mm

Lz	lz
0,60	0,43

Family **Hippothoidae** Levinsen, 1909

Hippothoidae Levinsen, 1909: 274. Hayward & Ryland, 1979: 246.

Trypostega Levinsen, 1909

Trypostega Levinsen, 1909: 280. Hayward & Ryland, 1979: 258.

Trypostega venusta (Norman, 1864)

Lepralia venusta Norman, 1864: 84, pl. 10 (figs 2–3).
Trypostega venusta: Hayward & Ryland, 1979: 258, fig. 111.

Material

Stations SM 163, SM 163/164, SM 164, SM 239.

Distribution

Trypostega venusta has a circumtropical, warm-temperate distribution. It has been reported from the Red Sea, Mauritius, and east Africa (Harmer 1957) but has not been recorded before from South Africa.

Family **Gigantoporidae** Bassler, 1935

Gigantoporidae Bassler, 1935: 32. Harmer, 1957: 878.

Gigantopora Ridley, 1881.

Gigantopora Ridley, 1881: 47. Harmer, 1957: 879.

Gigantopora polymorpha (Busk, 1884)

Gephyrophora polymorpha Busk, 1884: 167, pl. 34 (fig. 2).
Adeonella ponticula O'Donoghue, 1924: 54, pl. 4 (fig. 23).
Gigantopora polymorpha: Brown, 1952: 208, figs 145–146. Hayward & Cook, 1979: 81.

Material

Stations SM 179, SM 180, SM 185.

Remarks

Numerous live colonies of this characteristically South African species were collected at stations SM 179 and SM 185.

Gigantopora foraminosa sp. nov.

Fig. 11E–F

Material

Holotype: SAM–A26437, station SM 163/164, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 131, SM 163, SM 163/164, SM 164, SM 184.

Description

Colony erect, rigid, cylindrical, branching irregularly; attached by an encrusting base, up to 21 mm high in present material, the branches broadening

distally. Zooids in alternating longitudinal series, disposed all around the branch axis; rectangular, flat or slightly convex, separated by distinct raised sutures. Primary orifice longer than wide; anter D-shaped, poster concave, constituting a broad, shallow, U-shaped sinus between small lateral condyles. Frontal wall closely perforated by numerous round pores, each in a distinct pit. Peristomial complex occupying distal half of zooid; initiated by the development of paired lateral oral avicularia with elongate, acute triangular rostra, directed medially. These arch over the primary orifice and fuse medially; proximal to the area of fusion, a transversely oval spiramen communicates with the space above the primary orifice, distally a rim of calcification delimits a semicircular secondary orifice. Border of secondary orifice frequently peaked medially on either or both the distal and proximal edge. The gap between the two avicularian cystids is infilled as the opening of the spiramen is elaborated; this develops a lobed distal hood, above which two further lacunae are seen, separated medially by a longitudinal ridge. In later ontogenetic stages these lacunae are completely obliterated. Ovicell large, prominent but partially immersed; broadly oval and densely punctured by small pores, becoming rather rugose. Secondary orifices of ovicellate zooids broader than those of non-ovicellate zooids. Vertical walls of zooids with large and distinct multiporous septula.

Etymology

Foraminosus (L.)—full of holes.

Remarks

This species is distinguished from *G. polymorpha* by its generally larger dimensions, by its relatively longer primary orifice, and by the characteristic twinned lacunae below the oral avicularia. A similar fossil species, *Porina cribraria*, was described from the Australian Tertiary by MacGillivray (1895: 104, pl. 14 (fig. 25)).

Measurements (mean values) in mm

Zooids			Ovicell		
n	Lz	lz	n	Lov	lov
25	1,07	0,6	8	0,48	0,66

Family **Adeonellidae** Gregory, 1893

Adeonellidae Gregory, 1893: 241. Cook, 1973: 246.

Adeonella Busk, 1884

Adeonella Busk, 1884: 183. Cook, 1968: 180.

The genus *Adeonella* is abundantly represented in eastern South African waters and a total of 15 species may now be recognized. *A. regularis* (Busk,

1884) seems to have been the first species to be described from this area; the type specimen is no longer extant, however, and the status of this species remains to be clarified. Similarly, *A. pygmaea* Levinsen (1909), the identity of which even Levinsen was uncertain about, has not been reported since the original, rather brief account. O'Donoghue (1924) described four new species of *Adeonella* from South Africa; *A. coralliformis*, *A. expansa*, and *A. ligulata* are well-defined species, the type specimens of which have been examined during the preparation of this account. *A. ponticula* O'Donoghue (1924) has proved to be identifiable with *Gigantopora polymorpha* (Busk) (Hayward & Cook 1979); *A. pectinata* Busk, described from a single specimen collected by the *Challenger* off Cape York, Queensland, was reported by O'Donoghue (1924) from two South African localities but his specimens prove to represent *A. gibba* sp. nov. *Adeonella meandrina* O'Donoghue & De Watteville (1944) has been shown (Cook 1973) to be referable to the umbonuloid genus *Adeonellopsis*, and *A. jellyae* Levinsen (1909) may be assigned to *Laminopora* Michelin, 1842 (Cook 1983*a*).

The first *Meiring Naude* collections included two undescribed species of *Adeonella*, *A. majuscula* and *A. cracens* (Hayward & Cook 1979). *A. falcicula* and *A. cultrata* were then described (Hayward 1981) from South African specimens collected by the *Galathea* deep-sea expedition. The present collections yielded eight new species of *Adeonella*, and it would seem useful at this stage to present a key to the presently known South African species of the genus. The morphological features of most use in distinguishing between the different species are: the shape of the primary orifice, the shape and position of the spiramen, the size, orientation, and position, relative to the secondary orifice, of the peristomial avicularia. Certain later ontogenetic features seem to be consistent in some species, and the form of the colony may prove also to be an important character.

PROVISIONAL KEY TO THE SOUTH AFRICAN SPECIES OF *ADEONELLA*

1. Primary orifice orbicular, oval or quadrate, without a sinus 2
— Primary orifice with a distinct sinus 6

2. Primary orifice longer than broad, quadrate. Spiramen broadly oval, developing a proximal concavity in later ontogeny; flanked by one or two small medially directed avicularia. Other avicularia rare. Marginal vicarious avicularia absent
A. infirmata sp. nov.
— Primary orifice oval or rounded. No concavity proximal to spiramen 3

3. Primary orifice almost circular. Spiramen oval, situated close to distal end of peristome, flanked by small paired medially directed avicularia, a second pair often present on distal rim of peristome. Marginal vicarious avicularia absent
A. falcicula Hayward (1981)
— Primary orifice transversely oval. Spiramen flanked by paired or single avicularia. Enlarged vicarious avicularia present on colony margins 4

4. Spiramen distinctly oblong, its primary outline contrasting with, and visible beneath, the rounded opening developed in later ontogeny. Small paired avicularia developed lateral to spiramen, extending distally towards, but not reaching the proximal border of the secondary orifice ..... *A. cracens* Hayward & Cook (1979)
— Spiramen round or oval at all ontogenetic stages 5

5. Spiramen large, round; situated in the middle of the zooid, well proximal to the secondary orifice. A single avicularium present in early ontogeny, elongate, extending obliquely medially, between the spiramen and the secondary orifice. Smaller frontal avicularia abundant in later ontogenetic stages ..... *A. majuscula* Hayward & Cook (1979)
— Spiramen large, oval; situated in distal half of zooid, close to base of peristomial calcification. A single frontal avicularium developed just proximal to spiramen, extending obliquely distally towards, and almost reaching, the proximal border of the secondary orifice. Other frontal avicularia apparently absent ... *A. cultrata* Hayward (1981)

6. Spiramen, in *early* ontogenetic stages, overarched from one side by a distinct hood, so that the plane of its aperture is perpendicular to the frontal plane of the zooid. A small distally directed avicularium adjacent to spiramen 7
— Spiramen, in *early* ontogenetic stages, with a low distal arch, and frequently with a distinct concavity proximal to it, or normal to frontal plane, but without a laterally developed hood 9

7. Primary orifice as broad as, or broader than long. A single, median, proximally directed avicularium developing proximal to, and partly obscuring, the spiramen in later ontogeny. Colony forming slender blades ..... *A. gibba* sp. nov.
— Primary orifice longer than broad. No median, proximally directed avicularium .. 8

8. Sinus of primary orifice forming a short symmetrical U. Small avicularia frequent on frontal wall and around peristome in later ontogeny. Colony forming slender blades *A. abdita* sp. nov.
— Sinus of primary orifice forming a broad, shallow U. Small avicularia infrequent in later ontogeny; typically one extending obliquely between spiramen and secondary orifice, and one orientated transversely along proximal border of secondary spiramen. Colony forming broad, flat plates..... *A. expansa* O'Donoghue (1924)

9. Spiramen large, oval or circular, with the sinus visible through it in at least the earliest ontogenetic stages 10
— Spiramen small, circular, sinus not visible 14

10. Primary orifice with slender, pointed sinus. A single, median, proximally directed avicularium developed proximal to the spiramen in later ontogeny. Colony forming short, broad plates ..... *A. alia* sp. nov.
— Primary orifice with a V- or U-shaped sinus. Colony typically forming slender blades.. 11

11. Sinus narrow, parallel-sided. Peristomial avicularia typically paired, arising distal to spiramen and extending medially above distal border of secondary orifice *A. decipiens* sp. nov.
— Sinus forming a symmetrical, broader U-shape. Peristomial avicularia single or paired 12

12. Primary orifice broader than long. Peristomial avicularium single, short; situated adjacent to spiramen, extending obliquely distally towards proximal border of secondary orifice ..... *A. conspicua* sp. nov.
— Primary orifice as long as, or longer than broad. Peristomial avicularia typically paired 13

13. Peristomial avicularia paired, arising distal to spiramen and directed medially, the apices of the rostra almost converging distal to the secondary orifice. Frontal wall convex proximal to spiramen ..... *A. coralliformis* O'Donoghue (1924)
— Peristomial avicularia paired, arising adjacent to, or just distal to the spiramen and directed medially, extending between the spiramen and the proximal border of the secondary orifice. Frontal wall concave proximal to spiramen; later filled by a proximally directed avicularium ..... *A. confusanea* sp. nov.

14. Primary orifice as broad as long, anter and poster of almost equal length. Spiramen situated in distal half of zooid but distant from the proximal border of the secondary orifice ..... *A. distincta* sp. nov.
— Primary orifice much broader than long; poster very shallow, constituting less than one-third of orifice length. Spiramen small, situated close to proximal border of secondary orifice ..... *A. ligulata* O'Donoghue (1924)

Adeonella majuscula Hayward & Cook, 1979

Adeonella majuscula Hayward & Cook, 1979: 82, fig. 10E–H.

Material

Station SM 233.

Remarks

Part of a single large colony, 75 mm high, was collected from a depth of 540–80 m.

Adeonella cracens Hayward & Cook, 1979

Adeonella cracens Hayward & Cook, 1979: 85, fig. 10I–L. Hayward, 1981: 44, Fig. 22A.

Material

Station SM 103.

Remarks

Dead fragments only were recovered from the above station.

Adeonella decipiens sp. nov.

Fig. 21A–E

Material

Holotype: SAM–A26438, station SM 163, 33°04,6′S 28°06,6′E, 90 m.

Other material: stations SM 131, SM 163/164, SM 179, SM 180, SM 184, SM 185.

Description

Colony erect, branching, rigid; branches bilaminar, slender, up to 5 mm wide. Zooids oval to hexagonal, broadening distally, tapered proximally, separated by indistinct grooves which are increasingly obscured in older zooids. Primary orifice semi-orbicular, sinus slender, U-shaped; peristome thickened, prominent, tending to project from branch surface; inner proximal edge with a blunt projecting knob (Fig. 21B), later hidden as secondary calcification progresses, secondary orifice eventually orbicular. Frontal wall convex, finely granular, with numerous small pores, indistinct in newly developed zooids, more pronounced in later ontogenetic stages. Spiramen oval and large, situated at base of peristome so that calcification between it and the secondary orifice forms merely a slender bridge in young zooids; despite further thickening, the proximal border of the primary orifice is visible in all but the most heavily calcified zooids. Adventitious avicularia paired, lateral to the orifice, rostrum acute triangular, directed distomedially along the distal border of the secondary orifice. In later ontogenetic stages these avicularia may be obliterated and replaced by a second generation with a similar orientation, or more proximally

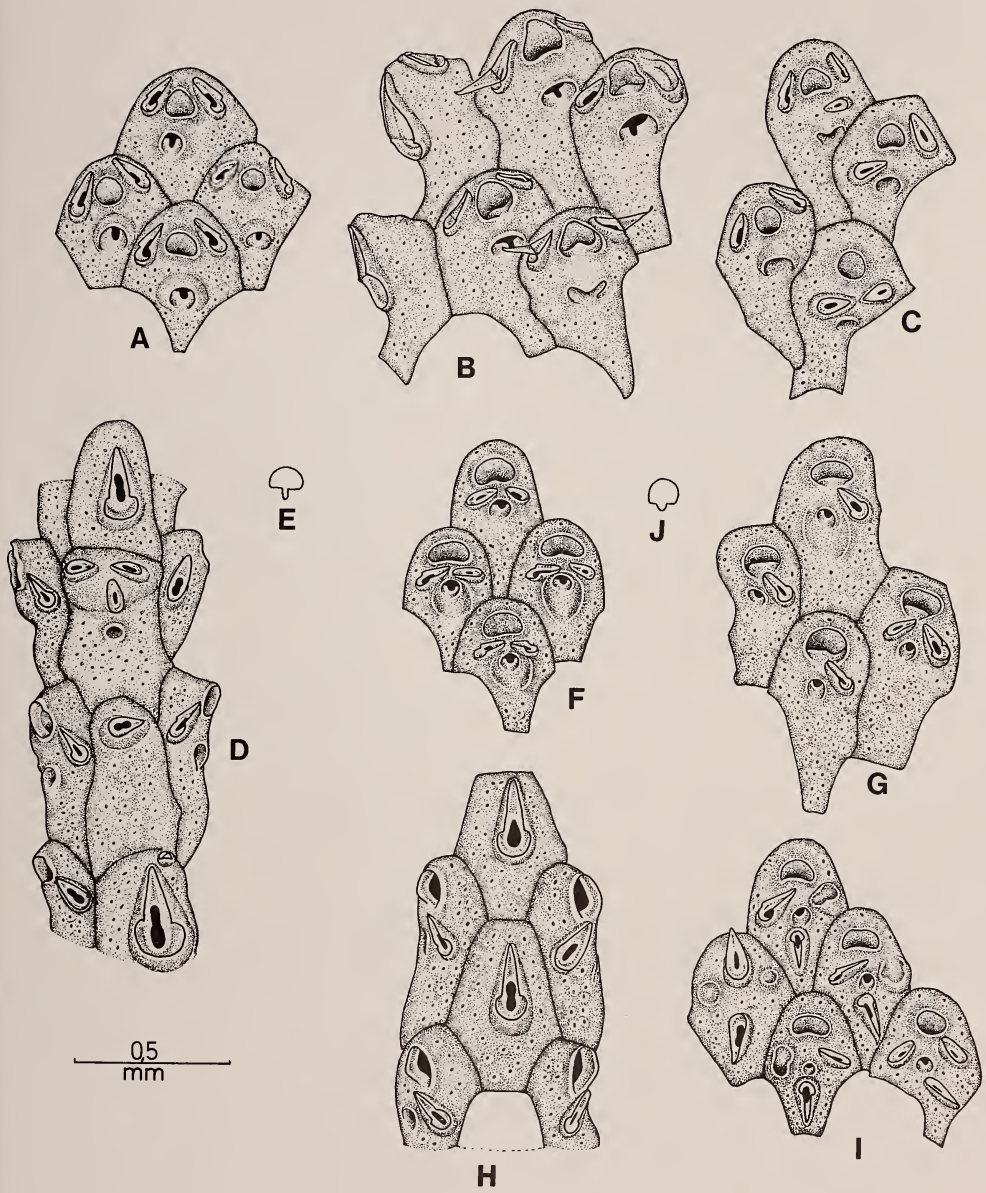

Fig. 21. A–E. *Adeonella decipiens* sp. nov. A. Four typical zooids. B. Zooids from a growing edge, showing characteristic shape of early peristome. C. Older zooids with hooded spiramina. D. View of a branch edge, showing vicarious and adventitious avicularia. E. Outline diagram of primary orifice. F–J. *Adeonella confusanea* sp. nov. F. Young zooids, with concave frontal walls. G. Later zooids, with thickened frontal walls. H. View of a branch edge, with vicarious avicularia. I. Zooids from near the base of the colony, with secondarily developed frontal avicularia. J. Outline diagram of primary orifice.

situated with the rostra extending between the spiramen and the proximal border of the secondary orifice; rarely, the avicularia may be developed frontally, proximal to the spiramen. Vicarious avicularia developed along the branch edge, with enlarged, distally directed rostra, interspersed with what may be small kenozooids, or autozooids with obliterated orifices; both these and the vicarious avicularia may bear small adventitious avicularia.

Etymology

Decipia (L.)—deception, a reference to the similarity between this species and *A. coralliformis*.

Remarks

At the distal tips of branches the peristomes and avicularia project markedly from the surface. With continued calcification both are progressively immersed, the spiramen becomes deeply sunk, more rounded and smaller. *A. decipiens* is superficially similar to *A. coralliformis* O'Donoghue but is readily distinguished by the small size of its zooids and by the primary orifice, which is almost circular in *A. coralliformis*. The material included numerous living and dead fragments, up to 22 mm long.

Measurements (means of 25 values) in mm

Lz	lz
0,50	0,36

Adeonella confusanea sp. nov.

Fig. 21F–J

Material

Holotype: SAM–A26439, station SM 185, 33°39,3′S 27°11,6′E, 90 m.
Other material: stations SM 163, SM 163/164, SM 179, SM 185.

Description

Colony erect, branching, rigid, attached by an encrusting base; branches bilaminar, up to 39 mm long in present material, with a maximum width of 4 mm. Zooids oval to rectangular, hexagonal in central part of branch, convex, separated by deep grooves. Primary orifice semi-orbicular, with a short U-shaped sinus; peristome with a broad blunt denticle within proximal border, visible in earlier ontogenetic stages, developing a transversely oval secondary orifice. Avicularia typically paired, occasionally single, arising lateral to spiramen, rostrum acute triangular, directed distomedially between spiramen and secondary orifice, close to the proximal border of the latter. Frontal wall granular, convex and rather rugose, with numerous small pores; spiramen circular, situated close to proximal base of peristome, sinus visible through it in

youngest zooids. Later in ontogeny, additional avicularia may be developed elsewhere on the frontal wall; most frequently, a single avicularium is developed medially, proximal to spiramen. Proximally directed vicarious avicularia present in a single linear series along the branch edge.

Etymology

Confusaneus (L.)—mixed, referring to characters shared with other species (below).

Remarks

The proximally directed frontal avicularium, which develops in later ontogenetic stages, is also seen in *A. abdita* (p. 97). However, that species may be distinguished from *A. confusanea* by the shape of the primary orifice (Fig. 23D), and by the broad, flat, plate-like branches of the colony.

Measurements (means of 25 values) in mm

Lz	lz
0,48	0,27

Adeonella conspicua sp. nov.

Fig. 22A–D

Material

Holotype: SAM–A26440, station SM 179, 33°30,3′S 27°22,1′E, 80 m.

Description

Colony erect, branching, rigid. Zooids oval to hexagonal, or irregular, separated by distinct grooves. Primary orifice almost semicircular, with a short, wide and shallow sinus. Peristome thickened, nodular, but relatively depressed, secondary orifice semicircular. Frontal wall convex, nodular, with small but distinct pores; spiramen circular, situated close to base of peristome. Sinus of primary orifice visible through it in newly developed zooids. Avicularia typically single, rarely paired, situated lateral to spiramen; rostrum triangular, relatively short, at an acute angle to frontal plane, directed distomedially or, rarely, proximally. In zooids towards the basal region of the colony, avicularia may be developed elsewhere on the frontal wall. Marginal vicarious avicularia very characteristic, rostrum hooked and projecting from the edge of the branch; interspersed with smaller types, or bearing them.

Etymology

Conspicuus (L.)—manifest, referring to the characters of the species.

Remarks

A single juvenile colony was found, 9 mm high and bearing three short lobes with a maximum width of 2 mm. Despite this shortage of material, the

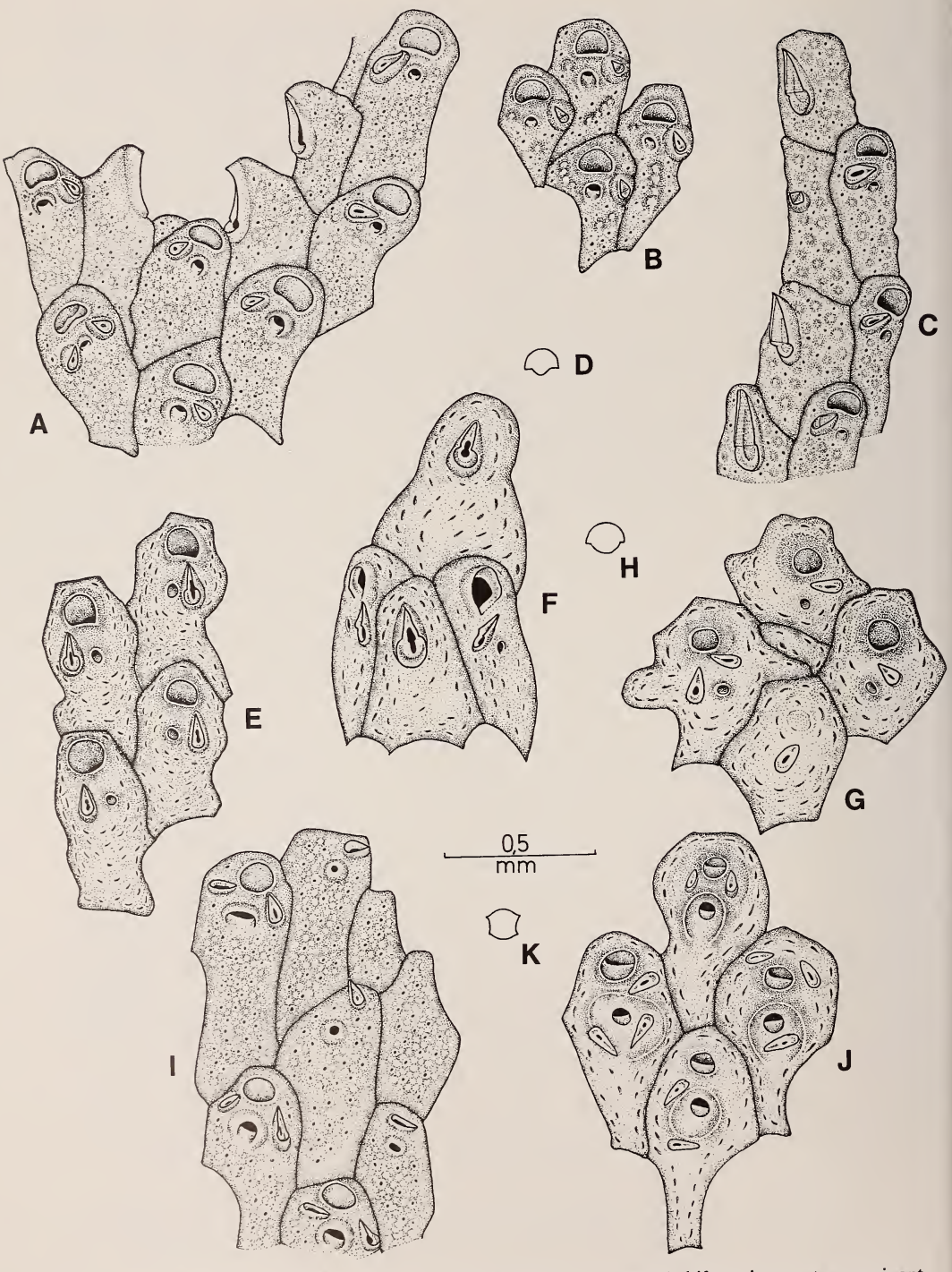

Fig. 22. A–D. *Adeonella conspicua* sp. nov. A. Young zooids at a branch bifurcation, note prominent hooked avicularian rostra. B. Older zooids with nodular frontal walls. C. The branch edge, with vicarious avicularia. D. Outline diagram of primary orifice. E–H. *Adeonella distincta* sp. nov. E. Four typical zooids. F. The branch edge, with vicarious avicularia. G. Old zooids from the colony base. H. Outline diagram of primary orifice. I–K. *Adeonella infirmata* sp. nov. I. Young zooids from close to the colony margin, note kenozooids on right. J. Old zooids with thickened frontal walls. K. Outline diagram of primary orifice.

specimen seems sufficiently distinctive to warrant the introduction of a new specific name.

Measurements (means of 25 values) in mm

Lz	lz
0,47	0,25

Adeonella distincta sp. nov.

Fig. 22E–H

Material

Holotype: SAM–A26441, station SM 185, 33°39,3′S 27°11,6′E, 90 m.

Description

Colony erect, branching, rigid, attached by encrusting base; branches bilaminar, slender, up to 35 mm long in present material, with a maximum width of 2 mm. All branches in the same plane. Zooids elongate, rectangular, separated by deep grooves, becoming irregular in outline in later ontogeny. Primary orifice broadly drop-shaped: anter semicircular, poster forming a broad and symmetrical U-shape. Peristome developing an orbicular secondary orifice. Avicularium single or, rarely, paired, situated lateral to spiramen and directed distally; rostrum acute triangular, not quite reaching the proximal border of the secondary orifice. Frontal wall convex, finely granular, with numerous small pores; spiramen more or less centrally placed, midway along the length of the zooid, at first longitudinally oval, becoming quite circular as frontal calcification thickens. Vicarious avicularia developed along branch edges, interspersed with small kenozooids, which may or may not bear small adventitious avicularia.

Etymology

Distinctus (L.)—different.

Remarks

The orientation of the frontal avicularium may vary within the colony, and in some zooids the rostrum may extend medially between the spiramen and the secondary orifice. In the oldest parts of the colony avicularia may be developed proximal to the spiramen, but there are rarely more than three per zooid. This species is most similar to *A. cracens* Hayward & Cook (1979) but is distinguished by the smaller size of its zooids and by the shape of the primary orifice, which in *A. distincta* is sinuate but in *A. cracens* forms a simple transverse ellipse. Fragments of three live colonies of this species were collected.

Measurements (means of 25 values) in mm

Lz	lz
0,59	0,30

Adeonella infirmata sp. nov.

Fig. 22I–K

Material

Holotype: SAM–A26442, station SM 239, 32°14,8′S 29°00,8′E, 90 m.

Description

Colony erect, branching, rigid, attached by an encrusting base; branches bilaminar, up to 45 mm high in present material, with a maximum width of 5 mm. Zooids elongate, hexagonal or rectangular, rounded distally and often tapered proximally; smallest zooids in middle region of branch. Primary orifice bell-shaped, proximal border shallowly convex below indistinct condyles. Peristome with orbicular secondary orifice. Avicularium single or paired, arising laterally at a level midway between the spiramen and the secondary orifice; rostrum acute triangular, short, directed distally or distomedially, typically extending to proximolateral corners of secondary orifice. Frontal wall convex, finely granular, evenly perforated by numerous small pores; spiramen situated close to proximal border of secondary orifice, large, transversely oval, arched, the proximal border of the primary orifice visible in all but the most heavily calcified zooids. Small adventitious avicularia may develop elsewhere on the frontal wall in the later stages of ontogeny, with variable orientation. Vicarious avicularia present in single linear series along branch edge, the rostra of which frequently project noticeably from the branch edge. These may alternate with small kenozooids.

Etymology

Infirmis (L.)—weak, referring to the rather delicate form of the colony.

Remarks

Zooid rows frequently terminate at the edges of the branch in small kenozooids which often bear adventitious avicularia. The longitudinal branch keel typical of some of the species described here (p. 99) is only poorly developed in *A. infirmata*; it seems to be formed from thickened frontal calcification rather than from inflated avicularian cystids, although small adventitious avicularia are more frequent in the middle regions of the branch. Fragments of five living colonies were collected.

Measurements (means of 25 values) in mm

Lz	lz
0,71	0,30

Adeonella abdita sp. nov.

Fig. 23A–E

Material

Holotype: SAM–A26443, station SM 239, 32°14,8′S 29°00,8′E, 90 m.
Other material: stations SM 163, SM 163/164, SM 164, SM 185.

Description

Colony erect, branching, rigid, attached by an encrusting base; branches bilaminar, up to 30 mm long in present material, with a maximum width of 5 mm. Zooids elongate, rectangular or oval, frequently tapered proximally; separated by distinct grooves, becoming obscured in older parts of colony. Primary orifice as wide as long, with inconspicuous, blunt lateral condyles demarcating a broad, shallow proximal sinus. Peristome with a transversely oval secondary orifice, the inner proximal edge developing a blunt denticle. Frontal wall convex, granular, closely punctured by numerous small pores. Spiramen medially situated in the distal third of the zooid, orbicular, oval or elongate, overarched from the left or right by a distinct hood, so that its opening appears to be perpendicular to the frontal plane of the zooid. A single avicularium adjacent to spiramen, rostrum acute triangular, directed distally; becoming quite immersed, below the level of the spiramen hood. A second avicularium may be developed on the other side of the spiramen, preventing complete development of its hood; occurs rarely in some colonies, more frequently in others. Additional avicularia may develop laterally, between the spiramen and the secondary orifice, smaller than the frontal type, single or paired, with rostrum directed towards the peristome. In the oldest parts of the colony these may be very frequent, with four or five developed around the distal end of the zooid, all directed towards the peristome. Frontal avicularia are progressively immersed and eventually completely obscured; peristomial avicularia then proliferate, but there is no regeneration of regularly orientated frontal avicularia (cf. *A. gibba*, p. 99).

In well-grown colonies each branch has a median longitudinal keel, formed by the development of numerous adventitious avicularia, each with a particularly voluminous cystid. Large vicarious avicularia present in single linear series along branch edges.

Etymology

Abditus (L.)—hidden, referring to the spiramen.

Remarks

Adeonella expansa O'Donoghue shows a similar development of the spiramen to that of *A. abdita*, but differs in that the adjacent avicularium is very small, being scarcely longer than the spiramen itself. Further, unlike the present species, the peristomial avicularia are almost medially situated, with

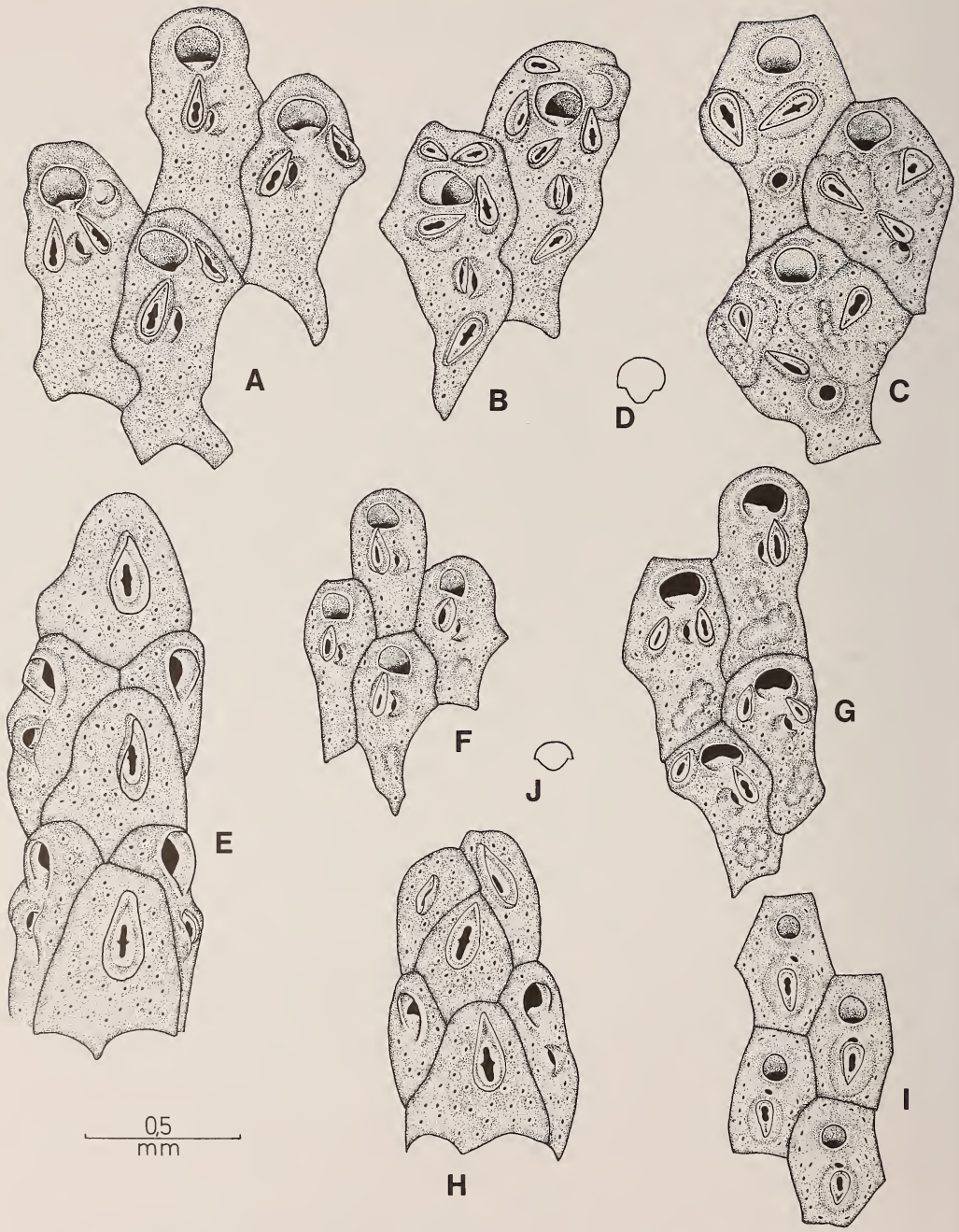

Fig. 23. A–E. *Adeonella abdita* sp. nov. A. Young zooids showing characteristic form of spiramen and adjacent avicularium. B. Older zooids, with numerous additional avicularia. C. Zooids from the branch keel, showing immersed spiramina and prominent avicularian cystids. D. Outline diagram of primary orifice. E. View of the branch edge, showing vicarious avicularia. F–J. *Adeonella gibba* sp. nov. F. Young zooids showing characteristic form of spiramen and adjacent avicularium. G. Later zooids with nodular frontal walls. H. The branch edge showing vicarious avicularia. I. Old zooids from the colony base, with proximally directed frontal avicularia. J. Outline diagram of primary orifice.

transversely orientated mandibles. The colony of *A. expansa* develops broad plate-like branches.

Measurements (means of 25 values) in mm

Lz	lz
0,76	0,34

Adeonella gibba sp. nov.

Fig. 23F–J

Adeonella pectinata: O'Donoghue, 1924: 51.

Material

Holotype: SAM–A26444, station SM 179, 33°30,3′S 27°22,1′E, 80 m.
Other material: stations SM 163, SM 163/164, SM 179, SM 180, SM 185.

Description

Colony erect, branching, rigid, rising from an encrusting base; branches bilaminar, up to 4 mm wide. Zooids oval to rectangular, convex; separated by deep grooves, less apparent in oldest parts of colony. Primary orifice as wide as long, proximal half constituting a broad shallow sinus. Peristome with an orbicular secondary orifice, inner proximal border with a broad shelf-like denticle. Frontal wall granular, closely perforated by numerous round pores which become accentuated as calcification continues; marginal series particularly prominent in later ontogenetic stages. A pronounced umbo frequently present on proximal frontal wall. Spiramen medially situated in distal half of zooid; relatively large and rather elongate, partly hidden by a lateral hood, the aperture thus appearing perpendicular to frontal plane of zooid. A single lateral avicularium developed, sporadically, just proximal to aperture, rostrum extending obliquely distally on to the peristome; frequently absent. Larger, vicarious, avicularia present in single linear series along branch edges, and often intercalated in zooid rows at the margins of the branch; mandible acute triangular, distally directed.

As secondary calcification proceeds the spiramen becomes deeply immersed, and the frontal wall quite concave; a second frontal avicularium is then budded, obscuring the first and partly filling the concavity. This new avicularium is orientated proximally in all zooids; the extended opening of the spiramen is just visible at its distal end. A median longitudinal ridge may be apparent along the branches of the oldest part of the colony, formed by the development of extra adventitious avicularia; elsewhere, however, the avicularia do not proliferate as they do in *A. abdita* (above).

Etymology

Gibbus (L.)—protuberant, referring to the frontal umbones of later zooids.

Remarks

The secondary frontal avicularium, with its constant orientation, is a characteristic feature of this species and serves to distinguish it further from *Adeonella abdita*.

Measurements (means of 25 values) in mm

Lz	lz
0,52	0,29

Adeonella alia sp. nov.

Fig. 24A–D

Material

Holotype: SAM–A26445, station SM 179, 33°30,3′S 27°22,1′E, 80 m.

Description

Colony erect, branching, rigid, attached by an encrusting base; branches bilaminar, broad and flat with lobed edges, up to 20 mm wide. Zooids rounded distally, tapered proximally. Primary orifice with semicircular anter and slender V-shaped poster, condyles strongly marked. Peristome with a semicircular or semi-elliptical secondary orifice, the inner proximal border thickened and raised medially to form a broad denticle with a serrated margin. Spiramen situated close to base of peristome, its orifice vertical to frontal plane of zooid; proximal edge incomplete in younger zooids, later quite rounded. Frontal wall finely granular, with large, deeply sunk pores giving it a rugose appearance. Avicularium single or paired, arising adjacent to spiramen, elongate rostrum directed distomedially towards the proximal border of the secondary orifice. When only a single avicularium is present a short conical umbo may be developed on the opposite side of the spiramen. In early ontogeny the middle area of the frontal wall, proximal to the spiramen, is deeply concave; subsequently an extra adventitious avicularium develops here, with a prominent tumid umbo and an elongate, proximally directed rostrum. Other, smaller, avicularia may develop elsewhere on the frontal surface, and along the branch edges, in the oldest parts of the colony.

Etymology

Alius (L.)—another.

Remarks

The single colony found was 40 mm high, with broad lobed branches; either flat, or concave, or distinctly twisted about the longitudinal axis. The concave frontal wall, and the subsequent development of a proximally directed avicularium, recall the morphology of *A. gibba* (above). However, *A. alia* is

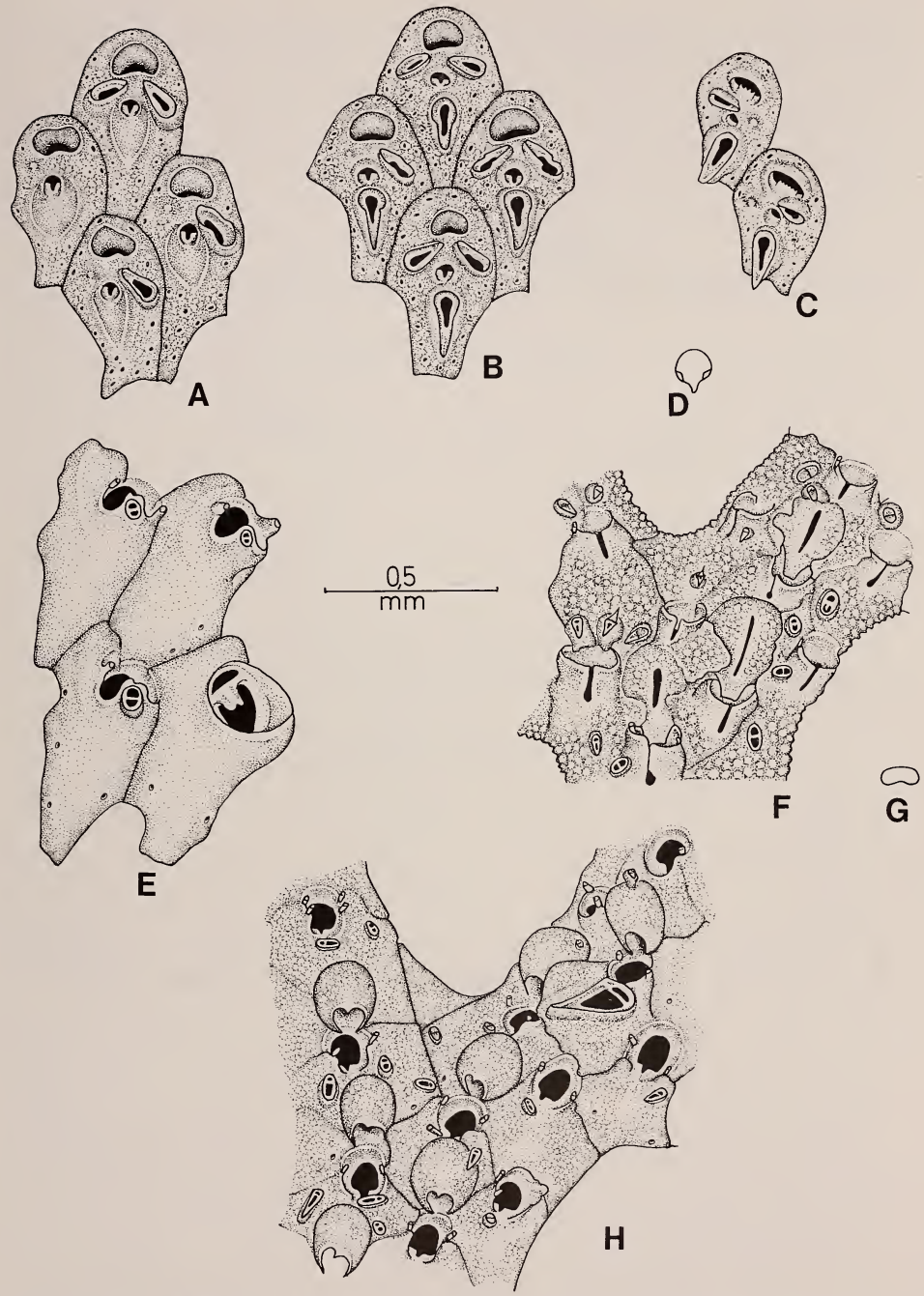

Fig. 24. A–D. *Adeonella alia* sp. nov. A. Young zooids, with typical concave frontal walls. B. Later zooids, with characteristic development of frontal avicularia. C. Two zooids in oblique view to show peristomial denticle. D. Outline diagram of primary orifice. E. *Reteporella dinotorhynchus* Hayward & Cook. F–G. *Sertella lata* (Busk). F. Portion of a colony showing ovicelled zooids. G. Outline diagram of primary orifice. H. *Schizoretepora tessellata* (Hincks).

distinguished from that species by the shape of the primary orifice, the form of the spiramen, and by the characteristic form of its colony.

Measurements (means of 20 values) in mm

Lz	lz
0,52	0,29

Family **Tessaradomidae** Jullien, 1903

Tessaradomidae Jullien *in* Jullien & Calvet, 1903: pl. 14. Hayward & Ryland, 1979: 242.

Tessaradoma Norman, 1869

Tessaradoma Norman, 1869: 309. Lagaaij & Cook, 1973: 494. Hayward & Ryland, 1979: 242.

Tessaradoma bispiramina Hayward & Cook, 1979

Tessaradoma bispiramina Hayward & Cook, 1979: 90, fig. 13A–D.

Material

Stations SM 103, SM 151, SM 233, SM 234.

Remarks

Living colonies were collected from stations SM 233 and SM 234, within the bathymetric range observed by Hayward & Cook (1979).

Tessaradoma circella Hayward & Cook, 1979

Tessaradoma circella Hayward & Cook, 1979: 91, fig. 13E–H. Hayward 1981: 48, fig. 25.

Material

Stations SM 103, SM 233.

Remarks

The astogeny of the basal attachment ring of *Tessaradoma circella* and the morphology of the ancestrula have recently been described by Hayward (1981).

Family **Sertellidae** Jullien, 1903

Sertellidae Jullien *in* Jullien & Calvet, 1903: 57. Hayward & Ryland, 1979: 260.

The genera and species here assigned to the Sertellidae do not, perhaps, constitute a natural assemblage, yet display a confusing similarity in many of their morphological features. Lagaaij (1952: 109–110) followed accepted taxonomic practice in proposing the use of Sertellidae Jullien (1903) for the genera then grouped in the old family Reteporidae Smitt (1868), the type genus of which (*Retepora* Lamarck, 1801) appears to have no recognizable or acceptable type species. Levinsen (1902, 1909) had expanded the Reteporidae to include encrusting, non-fenestrate genera such as *Rhynchozoon* and *Schizotheca*.

Despite the objection of Harmer (1933), this arrangement is now generally accepted (e.g. Osburn 1952; Powell 1967).

The substantial number of genera of both erect and encrusting forms presently included in the Sertellidae appears to have several important morphological characteristics in common. The primary orifice, though widely variable in shape, typically has a denticulate or beaded distal rim ('vestibular arch'), and distinct condyles; the ovicell is imperforate, often prominent, and in most species is provided with a conspicuous frontal lip or labellum. In several genera (*Sertella*, *Schizotheca*, *Triphyllozoon*, for example) the ovicell is further characterized by a frontal fissure of variable size and extent. The peristome is often well developed, often with a notch, fissure or 'pseudospiramen' proximally, and frequently incorporating a suboral avicularium. Adventitious and vicarious avicularia occur in most genera.

The genera of erect species seem to constitute a fairly homogenous group, although some species diverge from the common pattern. *Schizoretepora tessellata* (Hincks), for example, has a smooth orifice rim and a minimal development of the peristome. The growth form of this species (see p. 108), and of the bilaminate species of *Reteporella* described by Hayward & Cook (1979), perhaps suggest a link with the encrusting genera *Schizotheca* and *Rhynchozoon*. The ovicell of the former, moreover, is very similar to those of *S. tessellata* and *Reteporella*. *Rhynchozoon* is characterized principally by its distinctly beaded orifice rim, by the ovicell, which has a frontal 'area' of uncalcified ectooecium and often possesses a short labellum, and by the peristomial complex, which includes a hammer- or anvil-shaped uncinate process projecting distally over the orifice. The uncinate process is variably developed; in the new species here assigned to *Rhynchozoon* it varies from an inconspicuous structure in *R. incallidum* to the massive development seen in *R. oscitans* and *R. stomachosum*. In *R. ptarmicum* there is no uncinate process; this fact caused some difficulty in deciding to which genus the species should be assigned, but in comparison with certain other species in the present collections prompted consideration of the systematic relationships of the Sertellidae with other family groups.

The genus *Brodiella* was introduced by Uttley & Bullivant (1972) for *Schizoporella longispinata* Busk. This well-defined species was first described (Busk 1884) from the Straits of Magellan, was reported from two localities in the Chatham Islands, New Zealand (Uttley & Bullivant 1972), and was found in the present collections. The affinities of *Brodiella* with *Rhynchozoon* seem clear; in both genera the zooid has a conspicuously beaded orifice and the ovicell typically develops a distinct labellum. On this basis Gautier (1962) referred the warm-temperate North Atlantic species, *Lepralia armata* Hincks, to *Rhynchozoon* and it is now clear (D. P. Gordon 1978, *in litt.*) that the species is correctly placed in *Brodiella*. Curiously, Uttley & Bullivant (1972) remarked upon the similarity of the two genera, yet assigned *Brodiella* to the Schizoporellidae. Although the *Meiring Naude* specimens of *B. ignota* sp. nov.

did not include ovicelled zooids, its morphology seems quite consistent with the generic diagnosis of *Brodiella*. The genus is here placed within the Sertellidae, emphasizing its relationship to *Rhynchozoon*. However, it must then be recognized that there is a need to consider the systematic affinities of two large and heterogenous genera, *Cleidochasma* Harmer and *Hippoporella* Canu, both currently assigned to the family Cleidochasmatidae Cheetham & Sandberg (1964). Species of both genera were present in the *Meiring Naude* collections.

Cleidochasma perspicua sp. nov. (p. 76) conforms most nearly to the diagnosis of *Cleidochasma*, although its ovicell, which has a well-marked frontal labellum, is clearly more similar to those of *Rhynchozoon* and *Brodiella* than the spherical, tuberculate ovicells of most species of *Cleidochasma*. A second species, *C. contractum* (Waters), figured by Cook (1964*b*: 15, fig. 5A), also has the same, typically Sertellid, ovicell morphology and, moreover, a finely denticulate orifice rim. *Hippoporella labiata* sp. nov. (p. 80) constitutes a more severe test of current systematics, and its inclusion in *Hippoporella* can only be regarded as a doubtful compromise. The morphology of the ovicell and the denticulate orifice rim again suggest an affinity with the encrusting genera placed among the Sertellidae, but the species does not conform strictly with the taxonomic diagnosis of any of them. The lepralioid orifice and prominent suboral umbo suggest that it might be temporarily accommodated in *Hippoporella*, particularly as this genus includes many tropical species (e.g. Harmer 1957: 1096. Cook 1964*b*: 8) that seem to have little in common with the boreal-arctic type species, *H. hippopus* (Smitt). The Australian species *Schizoporella pulchra* MacGillivray (1891: 81, pl. 9 (fig. 7)) illustrates the apparent convergence of characters in tropical, particularly Indo-West-Pacific, species of these different genera. *S. pulchra* forms encrusting, multilaminar colonies (e.g. BMNH 1897.5.1.758); the zooid has a broadly cleithridiate orifice with a finely denticulate distal rim. There are single or paired lateral oral avicularia, with short, distally directed, semicircular mandibles; one of these is frequently supplanted by an enlarged avicularium with a slender spatulate mandible. These avicularia seem to be interzooidal in origin and analogous to those seen in *Brodiella*, yet the tall basally jointed spines and proximal peristome rim characteristic of that genus are lacking in *S. pulchra*. The ovicell is prominent, frontally flattened, with a large area of uncalcified ectooecium and in the older parts of the colony the frontal walls of many zooids are obscured by massive, frontally budded, vicarious avicularia with broad scaphoid mandibles. These features are most usually associated with *Rhynchozoon*.

It seems clear, in conclusion, that any further investigation into systematic relationships within the Sertellidae must be combined with a thorough review of the morphology and systematics of many tropical species at present placed among the Cleidochasmatidae. The need for such a study is highlighted by the anomalous positions of several species reported upon here, but is beyond the scope of the present work.

Sertella Jullien, 1903

Sertella Jullien *in* Jullien & Calvet, 1903: 57. Hayward & Ryland, 1979: 260.

Sertella lata (Busk, 1884)

Fig. 24F–G

Retepora lata Busk, 1884: 115, pl. 27 (fig. 1).

Material

Stations SM 163, SM 179, SM 185.

Description

Colony generally thick and robust; trabeculae composed of three to seven longitudinal series of zooids, fenestrulae oval, small, 0,5–1,0 mm long. Primary orifice of zooid about twice as broad as long, lacking the usual denticulate rim; condyles basally deflected and not visible in frontal view. Peristome thin, with a central fissure and a small proximal pseudosinus, a single short spine present on each edge of peristome. Adventitious avicularia numerous, distributed over the entire frontal surface of the colony, mandible either semi-elliptical or acute triangular, mostly less than 0,1 mm long; rarely, an enlarged avicularium occurs, with a triangular mandible up to 0,15 mm long. Ovicell prominent, pear-shaped, convex, with a longitudinal frontal fissure and a very long labellum extending deep into the peristome. Basal surface of colony densely papillate, with a few scattered avicularia; frontal calcification becoming similarly papillate in later ontogenetic stages.

Remarks

The most characteristic feature of *Sertella lata* is the pear-shaped ovicell with its very long labellum. This feature was not illustrated by Busk (1884, pl. 27 (fig. 1)) who shows the ovicell orifice opening just above the level of the peristome. However, examination of the type specimen shows this detail to be incorrect, and in all respects it is in close correspondence with the *Meiring Naude* material. This species is known only from South Africa.

Sertella verecunda sp. nov.

Figs 25, 26A

Material

Holotype: SAM–A26446, station SM 185, 33°39,3′S 27°11,6′E, 90 m.

Description

Colony robust, holotype 6 mm high with a spread of 15 mm. Trabeculae stout, comprising five to eight longitudinal series of zooids, fenestrulae irregularly oval, up to 2 mm long. Zooids hexagonal or irregular, small, about 0,4 mm long by 0,2 mm broad; frontal calcification tessellated, with a few large

distinct marginal pores. Primary orifice transversely oval, deeply immersed and seen only at broken edges. Peristome tubular and deep, secondary orifice scarcely raised above frontal surface of zooid, a single pair of lateral oral spines present in early ontogeny; proximal border with a rounded notch, later closed forming a circular pseudosinus, persisting through later ontogenetic stages. Avicularia sporadically developed on frontal wall, one, two or more per zooid, either short, with a rounded rostrum bearing a semicircular mandible, a thick cross-bar and stout columella, or more elongate, almost bispatulate, with a semi-elliptical mandible, a centrally placed cross-bar and a delicate columella. The short type has a denticulate distal margin to the rostrum. Large vicarious avicularia distributed around edges of fenestrulae; rostrum quadrate, parallel-sided, palatal foramen triangular, cross-bar slender with a delicate columella. Ovicell pyriform, smooth surfaced, with an elongate central fissure and a short labellum; obscured by a thickened ooecial cover early in ontogeny. Basal surface of colony with both types of adventitious avicularia, often numerous.

Etymology

Verecundus (L.)—bashful, an allusion to the hidden primary orifice.

Remarks

S. verecunda may be distinguished from other species of *Sertella* by its pronounced pseudosinus, and the absence of peristomial avicularia, by the two types of adventitious avicularia, and by the characteristic quadrate fenestral avicularia.

Schizoretepora Gregory, 1893

Schizoretepora Gregory, 1893: 224. Harmer, 1933: 619.

Schizoretepora tessellata (Hincks, 1878)

Fig. 24H

Retepora tessellata Hincks, 1878: 358, pl. 19 (figs 9–12). Busk, 1884: 112, pl. 27 (fig. 8). O'Donoghue & De Watteville, 1935: 210; 1937: 15. O'Donoghue, 1957: 91.

Material

Stations SM 163, SM 163/164, SM 180, SM 185.

Description

Colony rather delicate; trabeculae composed of four to six longitudinal series of zooids, or up to eight at points of trabecular fusion, fenestrulae elongate-oval, up to 1,6 mm long. Zooids hexagonal or irregular, rather flat, separated by distinct sutures at first, boundaries later indistinct. Primary orifice semi-elliptical, longer than wide; distal border smooth, proximal border gently concave, with a short notch-like sinus. Peristome developing initially as a thin erect flange on each side of the orifice, not developed proximally; later

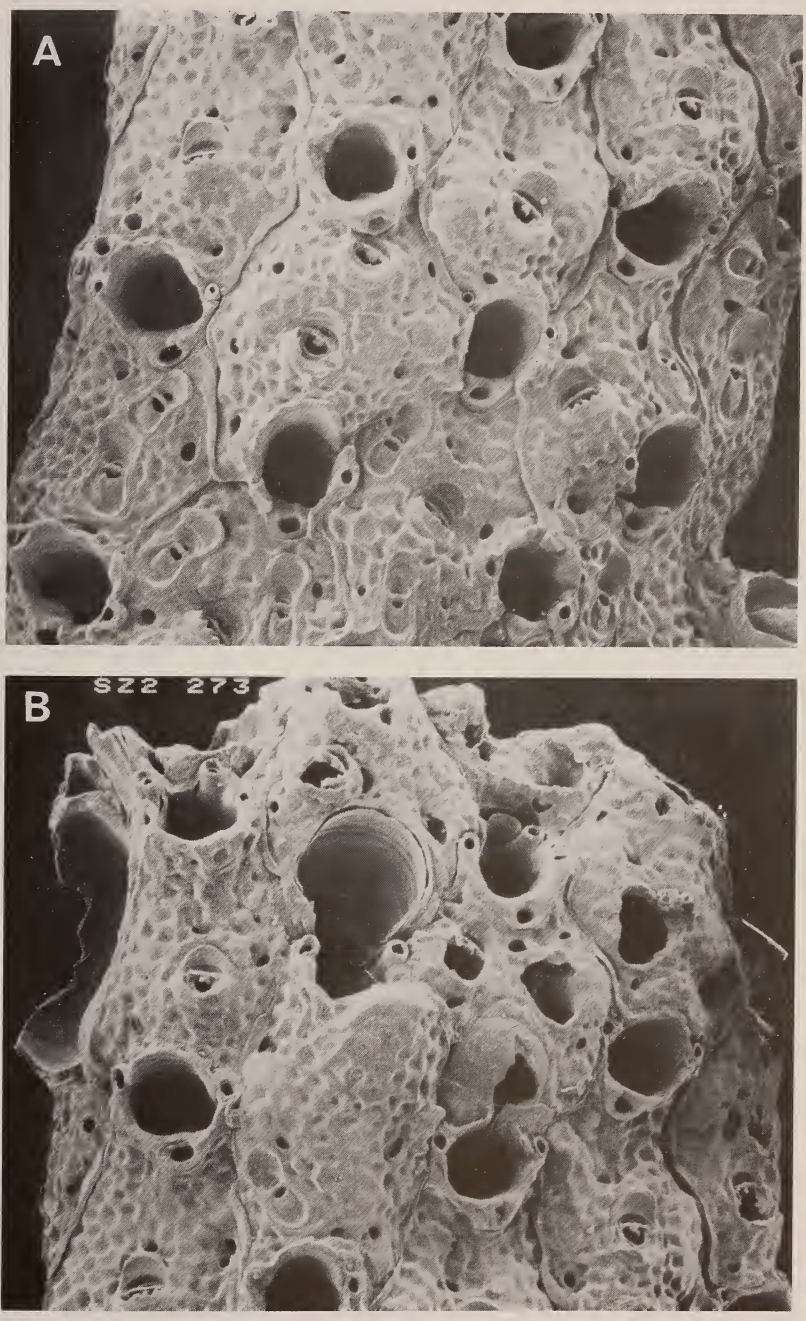

Fig. 25. *Sertella verecunda* sp. nov. A. Portion of a colony, showing avicularia and pseudospiramina. × 100. B. Zooids from the growing tip of a branch, with developing ovicells. × 100.

immersed and somewhat unclear, but proximal side of orifice still distinct. Up to six distal and lateral oral spines present, only the proximal pair of which persist as secondary calcification proceeds. Frontal calcification finely granular with a small number of marginal pores. Avicularia variably developed; frequently proximolateral to orifice, small, with a semi-elliptical mandible; also elsewhere on frontal wall, small, with more elongate, semi-elliptical or acute triangular mandibles. Gigantic avicularia typically frequent; cystid obscuring most of the zooid bearing it, rostrum elongate, acute triangular, up to 0,3 mm long, perpendicular to frontal plane of zooid. Ovicell prominent, spherical, with a conspicuous oval orifice situated well above peristome rim. Basal surface sutured, with numerous small avicularia and typically a gigantic avicularium at the proximal end of each fenestrula.

Remarks

Schizoretepora tessellata is unusual among the Sertellidae in possessing the facility to grow as a typical fenestrate colony, or as a folded bilaminar sheet. This facility may be expressed in a single colony, with substantial bilaminate colonies producing peripheral fenestrulae (e.g. BMNH 1962.6.4.17pt., Millers Point, Cape Town). Described originally from South Australia, it was reported from Simon's Bay (Cape of Good Hope) by Busk (1884). Comparison of Australian and South African specimens with the *Meiring Naude* samples shows some variation in the width of the primary orifice both between and within each of the three series of specimens. Additionally, some of the Australian specimens develop long (0,8 mm) antenniform spines. However, the avicularia and ovicells are closely comparable in all instances.

Reteporella Busk, 1884

Reteporella Busk, 1884: 126. Harmer, 1934: 572.

Reteporella dinotorhynchus Hayward & Cook, 1979

Fig. 24E

Reteporella dinotorhynchus Hayward & Cook, 1979: 95, fig. 14A–D.

Material

Stations SM 163, SM 163/164, SM 184, SM 185.

Remarks

The material from station SM 185 comprised a more complete ontogenetic sequence than was provided by the first *Meiring Naude* samples, and it is clear that the original description of this species must be amplified. In particular, it is evident that a small adventitious avicularium develops on the peristome adjacent to the lateral notch. This is missing in even the least worn fragments, and is obscured by the peristome in the oldest parts of the colony. Developing

ovicells were found in the present specimens, but no complete examples remained; the ovicell seems to have a substantial frontal fissure.

Iodictyum Harmer, 1933

Iodictyum Harmer, 1933: 624; 1934: 537.

Iodictyum flosculum sp. nov.

Fig. 27A–C

Material

Holotype: SAM–A26447, station SM 164, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163, SM 185.

Description

Colony white, forming a delicate cup shape, up to 8 mm high with a spread of 6 mm in present material; trabeculae composed of three alternating series of zooids, increasing to four or five at trabecular fusion, fenestrulae elongate-oval, up to 0,8 mm long. Zooids quadrate, rather flat, separated by distinct raised sutures; calcification smooth, imperforate except for a few rather large round marginal pores, usually situated at the proximal end of the zooid. Primary orifice semicircular, distal edge not denticulate, proximal edge slightly concave, with large blunt lateral condyles. Peristome characteristic of genus: developed early in ontogeny and completely hiding orifice; erect, broadly flared, the free edge drawn into a number of delicate spikes, aligned with a second series of smaller spikes around the inner rim of the peristome. The inner denticulations of the peristome are continuous with delicate ridges which extend down its interior surfaces; proximally, two of the ridges delimit a U-shaped channel which appears as a distinct pseudosinus in damaged zooids. With increasing calcification the peristome is immersed, the outer spikes are lost and the aperture appears as a simple denticulate opening. Avicularia infrequent, orientated oblique to proximal edge of peristome, rostrum elongate, subtriangular, hooked at tip. Ovicell not found. Basal surface of colony faintly papillate, crossed by conspicuous sutures, lacking avicularia.

Etymology

Flosculus (L.)—a little flower.

Remarks

This delicate species represents the first occurrence of the genus *Iodictyum* remote from the western Pacific.

Measurements (means of 20 values) in mm

Lz	lz
0,42	0,19

Rhynchozoon Hincks, 1895

Rhynchozoon Hincks, 1895: V. Hayward & Ryland, 1979: 271.

This large and difficult genus is widely distributed in both temperate and tropical waters. Most bryozoan faunas of the continental shelf seas include one or more species of *Rhynchozoon*, yet few of these are adequately characterized and taxonomic confusion obscures the identity of most of them. In almost all species of *Rhynchozoon* the primary orifice of the zooid becomes immersed in a secondarily developed peristomial complex which is frequently ornamented with a variety of knobs and processes, and there is often a proliferation of small adventitious avicularia. These later stages of ontogeny are often subject to great variation within a single colony and cannot be used as reliable specific characters. The shape of the primary orifice and the morphology of the suboral avicularium, together with its uncinate process, should be used as the most important features for discriminating between species and it is clear that when this is done a greater diversity of species is revealed than is apparent from the literature (e.g. Hayward 1974). These features, together with selected secondary characters, show that the South African fauna includes a rich variety of species, none of which from among those represented here may be identified with either of the two species described by O'Donoghue & De Watteville (1935), or with any of the Indo-West-Pacific species reported by Harmer (1957).

Rhynchozoon documentum sp. nov.

Fig. 26B–C

Material

Holotype: SAM–A26448, station SM 163/164, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163, SM 164.

Description

Colony encrusting, multilaminar, forming small nodular sheets. Zooids distinct only at growing edge, oval and convex; frontal wall smooth, with large marginal pores. Primary orifice broader than long; anter transversely oval, with finely denticulate rim, poster forming a short, U-shaped sinus, oral spines lacking. Suboral avicularium large, distinct in early ontogenetic stages, mandible elongate elliptical, uncinate process well developed and conspicuous, delimiting laterally a closed pseudosinus. Peristome developing a thickened rim obscuring primary orifice and suboral avicularium; proximally a median fissure is flanked by short conical processes, in later ontogeny further short columnar processes are developed around the whole of the secondary orifice. Frontal avicularia often numerous, small, with semicircular or semi-elliptical mandibles.

Etymology

Documentum (L.)—an example.

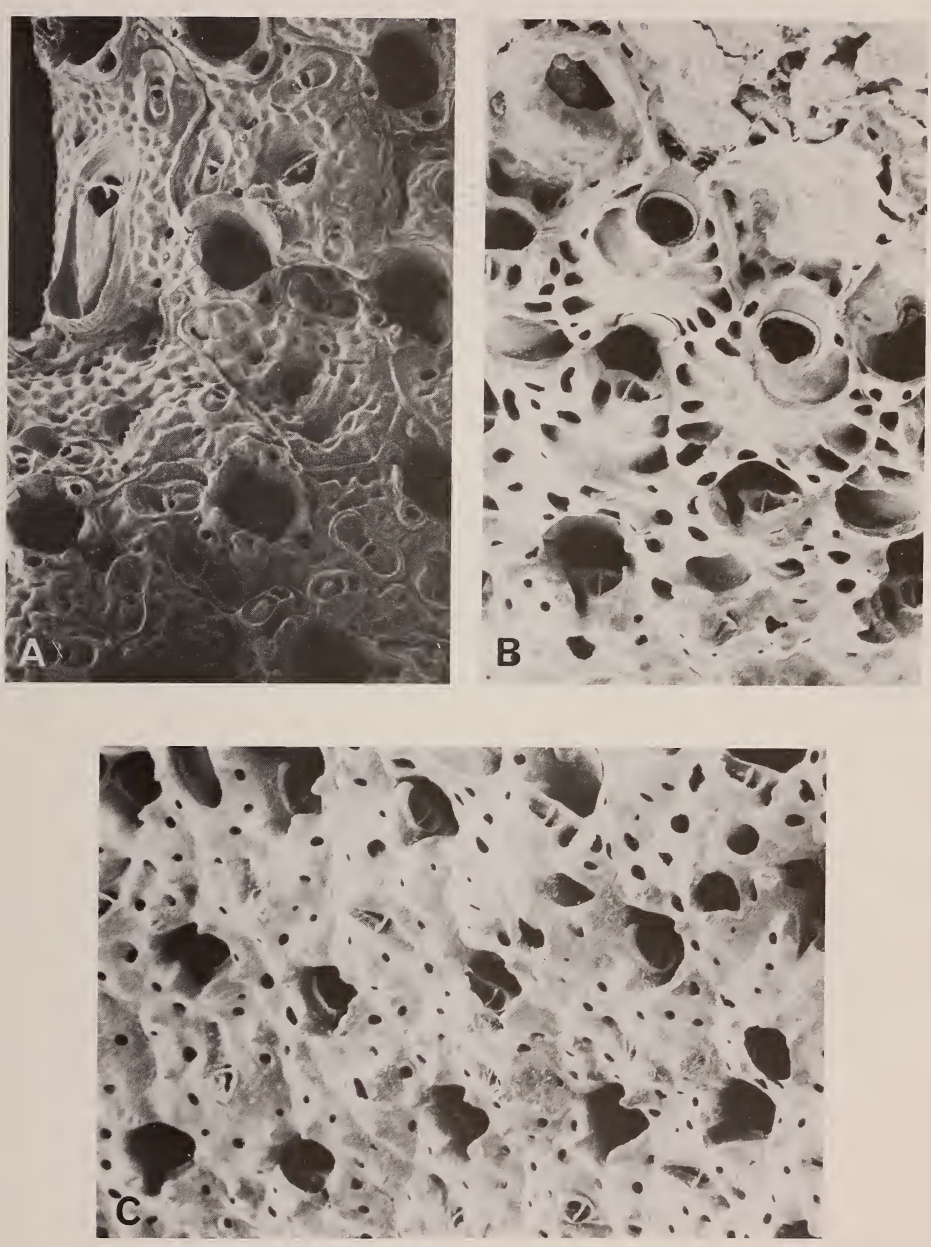

Fig. 26. A. *Sertella verecunda* sp. nov., the edge of a fenestrula (left) with a vicarious avicularium. × 96. B–C. *Rhynchozoon documentum* sp. nov. B. Zooids at a growing edge, note primary orifice and conspicuous areolae. × 76. C. Later zooids, each with one frontal avicularium and conspicuous areolae. × 64,3.

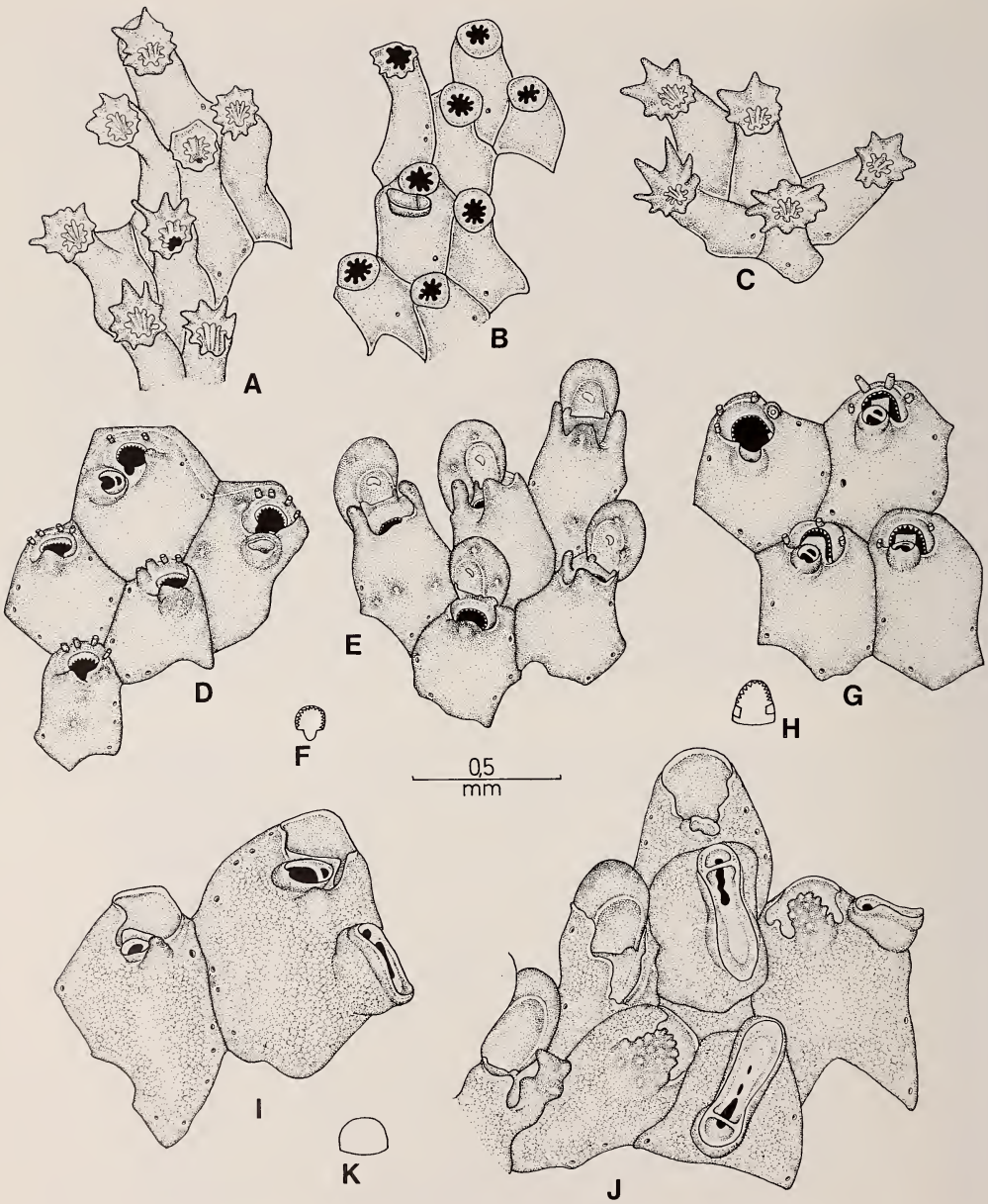

Fig. 27. A–C. *Iodictyum flosculum* sp. nov. A. Young zooids showing typical flared spinose peristomes. B. Old zooids with worn peristomes; a single suboral avicularium. C. a complete juvenile colony, possibly including the ancestrula. D–F. *Rhynchozoon incallidum* sp. nov. D. Zooids from the growing edge. E. Later zooids, with ovicells and developed peristomes. F. Outline diagram of primary orifice. G–H. *Rhynchozoon oscitans* sp. nov. G. Four young zooids; note conspicuous uncinate process. H. Outline diagram of primary orifice. I–K. *Rhynchozoon stomachosum* sp. nov. I. Two young zooids. J. Later zooids, with typical development of the umbo, and two vicarious avicularia. K. Outline diagram of the primary orifice.

Remarks

In later ontogenetic stages the marginal pores of the zooids are particularly distinct, appearing as elongate tubular structures within the rather vitreous calcification, and appear to be associated with the production of numerous small adventitious avicularia. This particularly conspicuous morphological feature seems to be a fairly constant characteristic of this species.

Measurements (means of 20 values) in mm

Lz	lz
0,39	0,32

Rhynchozoon beatulum sp. nov.

Fig. 28

Material

Holotype: SAM–A26449, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: stations SM 163/164, SM 184, SM 185.

Description

Colony encrusting, forming small irregular sheets, apparently unilaminar. Zooids oval to hexagonal, strongly convex; frontal wall finely granular, becoming increasingly vitreous in later ontogenetic stages, marginal pores conspicuous. Primary orifice wider than long; anter orbicular, with finely denticulate rim, poster broad, shallowly concave, two short, widely-spaced, distal oral spines present in newly budded zooids. Suboral avicularium large and distinct, rostrum hooked, with elongate triangular mandible; uncinate process bluntly triangular. Peristomial thickening moderate: a short, blunt umbo develops on the cystid of the avicularium, and a second umbo on the opposite lateral edge of the secondary aperture, with a small asymmetrically developed notch between; in later ontogenetic stages, one or two short knobs may be developed on the distal rim of the peristome. Frontal avicularia typically limited to one on each zooid, on the proximal half of the frontal wall; rostrum triangular, directed proximally. Ovicell rather elongate, with an oval area of uncovered entooecium frontally, and a large frontal labellum; obscured by a thickened ooecial cover.

Etymology

Beatus (L.)—happy, an allusion to the broad sinus.

Remarks

Despite the progressive thickening of the frontal calcification in later ontogeny, the marginal pores of *R. beatulum* remain distinct. Further, the suboral avicularium is rarely completely hidden, and the peristomial rim shows

only a limited development of umbones. The frontal avicularium is remarkably constant in position, shape and orientation in all the present specimens, and assists in distinguishing this species from others in the South African fauna.

Measurements (means of 20 values) in mm

Lz	lz
0,45	0,35

Rhynchozoon incallidum sp. nov.

Figs 27D–F, 29A–B

Material

Holotype: SAM–A26450, station SM 185, 33°39,3′S 27°11,6′E, 90 m.
Other material: stations SM 163, SM 163/164, SM 180, SM 184.

Description

Colony encrusting, forming small unilaminar patches. Zooids oval to hexagonal, frontal wall smooth and vitreous with few indistinct marginal pores. Primary orifice as wide as long: anter semicircular, with finely denticulate rim, poster forming a short quadrate sinus; up to four slender distal oral spines present. Suboral avicularium on a voluminous cystid, developed apically as a blunt umbo; rostrum triangular, perpendicular to frontal plane of zooid and facing laterally, uncinate process poorly developed, not prominent. A second umbo typically developed on opposite lateral border of orifice, a third may be present distal to the suboral avicularium; these develop independently of the spine bases. Frontal avicularia not found. Ovicell spherical, flattened frontally, with an irregular area of uncovered entooecium and a short, broad labellum. Ooecial cover developing early in ontogeny, frequently with one or more low umbones, but ovicell remaining conspicuous. Zooid boundaries become indistinct in later ontogenetic stages, additional umbones may be developed on the frontal wall, but the primary orifice is not deeply immersed and generally remains visible in frontal view.

Etymology

Incallidus (L.)—simple, referring to the relative simplicity of the zooidal morphology.

Remarks

The shape of the primary orifice, the poor development of the uncinate process and the relatively simple zooid morphology serve to distinguish *R. incallidum* from other species of *Rhynchozoon*.

Measurements (means of 20 values) in mm

Lz	lz
0,45	0,32

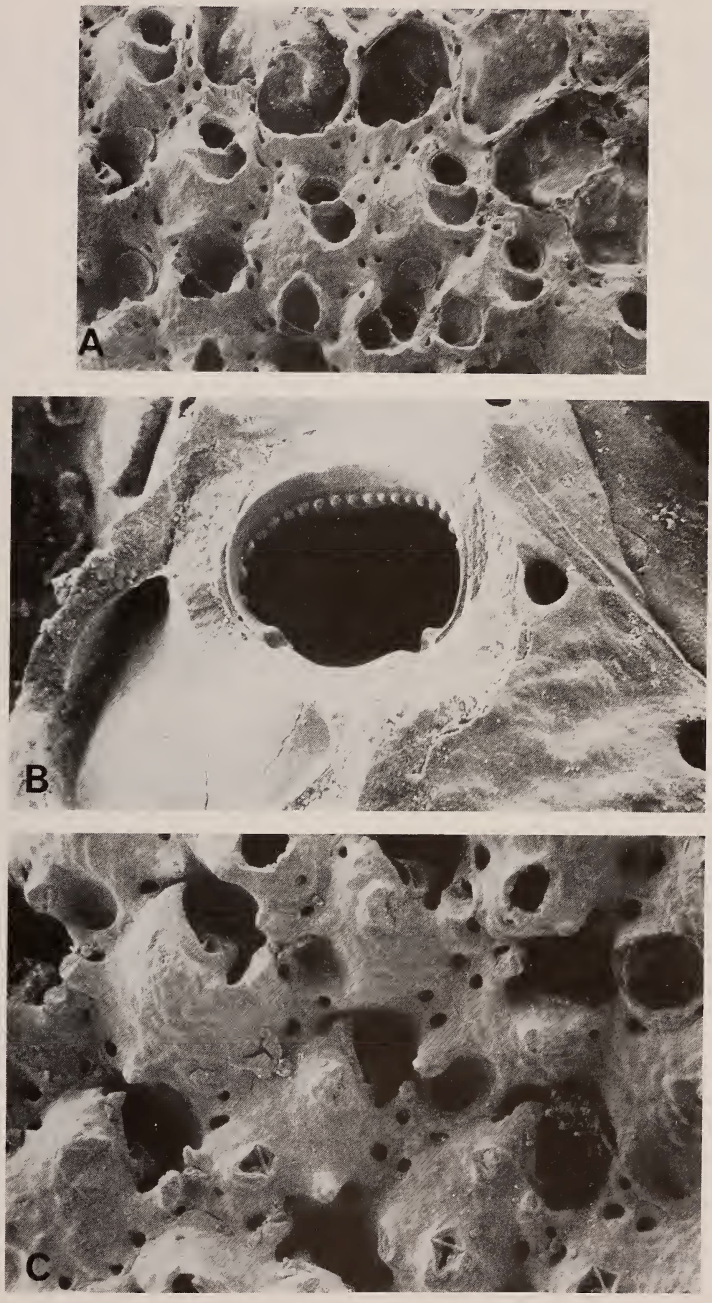

Fig. 28. *Rhynchozoon beatulum* sp. nov. A. Zooids at a growing edge. × 46,5. B. Details of a primary orifice. × 240. C. Later zooids, showing the characteristic frontal avicularium. × 61.

Rhynchozoon oscitans sp. nov.

Fig. 27G–H

Material

Holotype: SAM–A26451, station SM 185, 33°39,3′S 27°11,6′E, 90 m.
Other material: station SM 180.

Description

Colony encrusting, unilaminar. Zooids oval to hexagonal, convex, distinct, separated by well-marked sutures. Frontal calcification thick and smooth, with a few inconspicuous marginal pores. Primary orifice longer than wide, lepralioid; proximal edge straight, distolateral rim denticulate above massive rectangular, basally deflected condyles. Four or five oral spines present, the distalmost pair persisting as short stumps in later ontogeny. Peristome low; suboral avicularium situated medioproximally on outer peristome rim, at oblique angle to frontal plane, mandible small, semi-elliptical. Uncinate process large, quadrate, very conspicuous. Frontal avicularia and ovicells not found.

Etymology

Oscitans (L.)—yawning, referring to the conspicuous primary orifice.

Remarks

Only two small specimens of this species were found, and neither represents a complete astogenetic or ontogenetic sequence. However, the shape of the orifice, and the massive uncinate process are very distinctive and sufficient to distinguish *R. oscitans* from all known species of *Rhynchozoon*.

Measurements (means of 20 values) in mm

Lz	lz
0,53	0,37

Rhynchozoon stomachosum sp. nov.

Fig. 27I–K, 29C

Material

Holotype: SAM–A26452, station SM 234, 32°15′S 29°09,1′E, 500–520 m.

Description

Colony encrusting, multilaminar. Zooids at growing edge large, oval and convex; frontal calcification granular, becoming rather nodular in later ontogenetic stages, marginal pores few and small but distinct. Primary orifice D-shaped, wider than long; proximal border almost straight, distolateral rim

Fig. 29. A–B. *Rhynchozoon incallidum* sp. nov. A. A group of zooids from a dead colony. × 100. B. Detail to show primary orifice and spine bases. × 300. C. *Rhynchozoon stomachosum* sp. nov. × 41.

finely denticulate, apparently without condyles. No oral spines. Suboral avicularium obliquely transverse to orifice, at a slight angle to frontal plane; rostrum triangular, with hooked tip. Uncinate process large and conspicuous. Peristome morphology variable; typically developing a columnar, clavate umbo proximomedially, with a knobbed granular surface, adjacent to a shallow notch; two, rarely more, short processes may also be present on the lateral borders of the peristome. Alternatively, two shorter, more slender, equisized umbones may develop, flanking a more prominent peristomial notch. Frontal avicularia of two sizes: on peripheral zooids situated laterally, close to suture, and directed proximolaterally, the plane of the palate typically at a right angle to the frontal plane; in later ontogeny a larger avicularium may develop on the frontal wall along the midline of the zooid, directed proximally with the plane of the palate normal to the frontal plane. In both types the rostrum is elongate, slightly expanded distally to give a slender spatulate shape, straight or gently curved laterally; cross-bar entire, palate with a narrow, elongate central fissure. Ovicell longer than wide, flattened frontally, with a distinct labellum; frontal ectooecium finely tuberculate.

Etymology

Stomachosus (L.)—irritable, an allusion to the aggressive aspect of the peristomial complex.

Remarks

The material comprised a single colony, 20 mm in diameter, with an undulating, unilaminar growing edge and a thickened multilaminar central region. The calcification is thick, particularly that of the basal walls; the basal surface of the colony was apparently mostly unattached to the substratum, and is encrusted with epizooites.

Measurements (means of 20 values) in mm

Lz	lz
0,77	0,54

Rhynchozoon ptarmicum sp. nov.

Fig. 30

Material

Holotype: SAM–A26453, station SM 179, 33°30,3′S 27°22,1′E, 80 m.
Other material: stations SM 185, SM 239, SM 250.

Description

Colony encrusting, multilaminar, forming extensive nodular sheets. Zooids convex, large; frontal calcification thick and vitreous, becoming

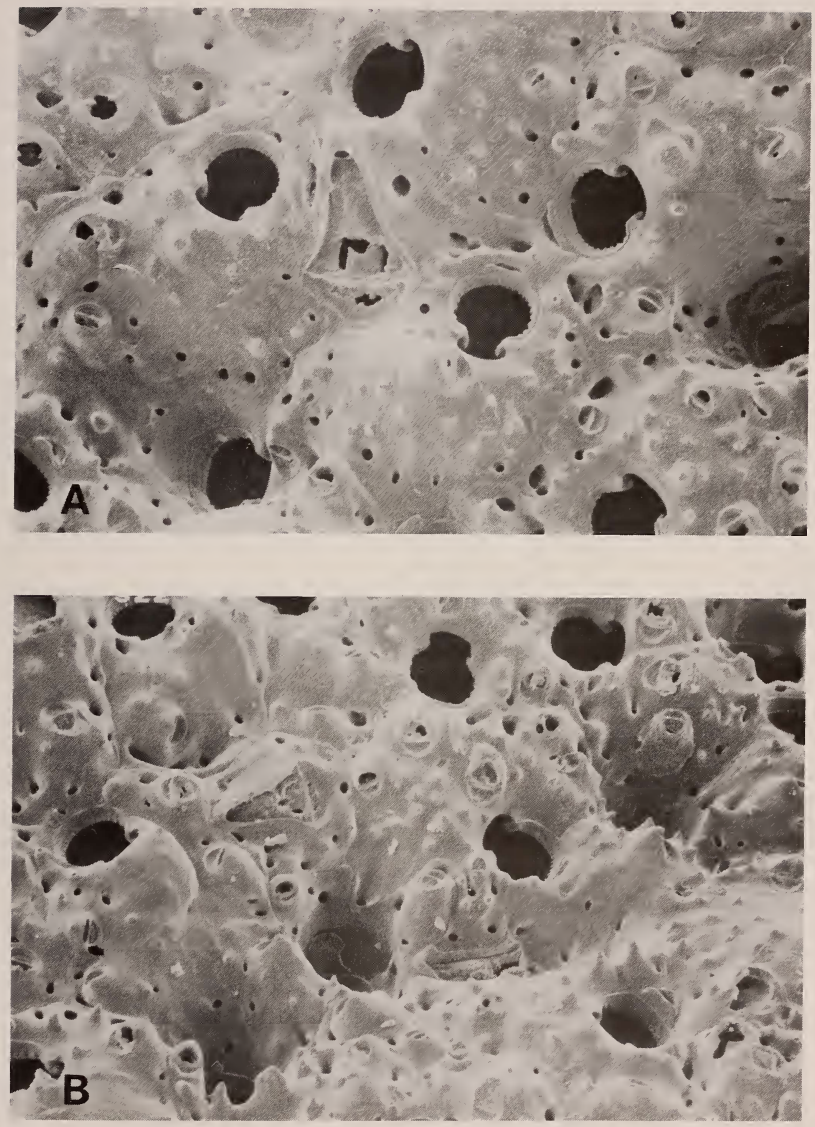

Fig. 30. *Rhynchozoon ptarmicum* sp. nov. A. Young zooids, showing the form of the primary orifice. × 67. B. Later zooids, showing proliferation of avicularia and orifices immersed in thickened calcification. × 50.

distinctly nodular in later ontogeny, marginal pores small. Primary orifice slightly longer than wide; anter orbicular, with finely denticulate rim, poster shallow, transversely elliptical; condyles large and conspicuous, triangular, basally deflected. Four to six distal oral spines present in early ontogeny, obscured by the development of a low thickened peristome, bearing a number of short conical umbones. Suboral avicularium small, not enveloped by the peristome and always distinct, rostrum at acute angle to frontal plane, directed obliquely laterally, mandible short, broadly subtriangular; sporadically developed and frequently absent. No uncinate process. Additional avicularia often abundant, of two types: small, adventitious, with a rounded cystid and short semicircular or subtriangular mandible, developed along lateral borders of zooid and encroaching on to frontal wall, often numerous, up to ten per zooid; large, ?vicarious, with a swollen cystid supporting an elongate, triangular, hooked rostrum (0,35 mm), with complete cross-bar and massive, quadrate, bifid columnella. A slightly smaller version of the latter type (?adventitious) may replace the suboral avicularium in some zooids. Ovicell elongate oval, frontal surface granular, striated, labellum distinct; ooecial cover developed in later ontogeny, often tuberculate.

Etymology

Ptarmos (Gr.)—a sneeze, an allusion to the open aspect of the orifice.

Remarks

Live colonies were collected from all four stations, the largest (SM 179) was a massive, nodular, multilaminar growth measuring 70 mm by 35 mm. The young colonies from SM 185 had a pale blue-grey coloration. The ?vicarious avicularia resemble those of *Strophiella tuberigera* Jullien & Calvet (1903: 66, pl. 9 (fig. 1)), reported from the Gulf of Gascony, from 135 m. *S. tuberigera* has a 'beaded' orifice and is probably referable to *Rhynchozoon*; it differs completely from *R. ptarmicum* in the shape of the primary orifice.

Measurements (means of 20 values) in mm

Lz	lz
0,73	0,52

Brodiella Uttley & Bullivant, 1972

Brodiella Uttley & Bullivant, 1972: 35.

Brodiella longispinata (Busk, 1884)

Fig. 31A–B

Schizoporella longispinata Busk, 1884: 163, pl. 17 (figs 2A, C).
Brodiella longispinata: Uttley & Bullivant, 1972: 36, fig. 26.

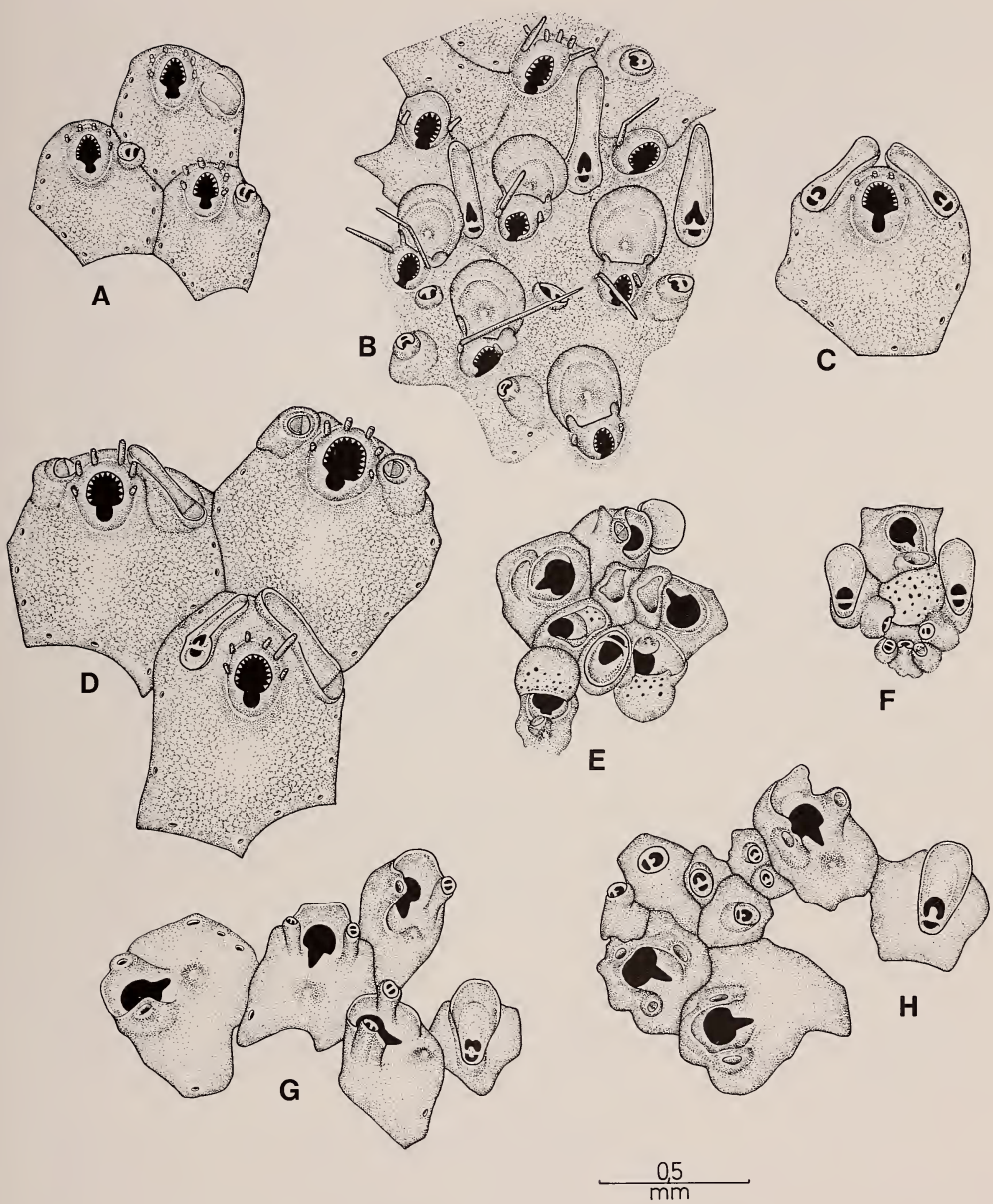

Fig. 31. A–B. *Brodiella longispinata* (Busk). A. Three young zooids. B. Portion of a colony showing ovicells and different types of avicularia. C–D. *Brodiella ignota* sp. nov. C. A typical zooid. D. Three zooids showing variation in avicularia type. E–F. *Turbicellepora conica* (Busk). E. Portion of a colony showing active frontal budding. F. Vicarious avicularia, and adventitious avicularia clustered on the peristome rim of a brooding zooid. G–H. *Turbicellepora valligera* sp. nov. G. Young zooids, showing typical development of the peristome. H. Zooids from an older part of the colony, with numerous small avicularia.

Material

Stations SM 185, SM 239.

Description

Colony encrusting, multilaminar. Zooids oval to hexagonal, heavily calcified, separated by distinct grooves at first, boundaries later obscured by secondary calcification. Primary orifice cleithridiate: anter orbicular, with a denticulate rim, separated from the short rounded poster by prominent condyles; operculum well chitinized, dark brown, with a distinct marginal sclerite and a longitudinal median groove. Six distal oral spines, jointed basally, of variable length, often greatly enlarged. Proximal side of orifice enclosed by a low, thickened, peristomial rim, extending between the bases of the most proximal pair of spines. Frontal wall thick, vitreous, with a characteristic surface of rounded nodules imparting a rippled effect; marginal pores infrequent and not readily visible. Avicularia adventitious, lateral to orifice, single or paired, cystid low, tumid, rostrum elliptical, pivotal bar stout with a thickened columnella, mandible semi-elliptical, directed laterally or obliquely distally. Either or both avicularia may be replaced by an enlarged type with an elongate, acute triangular mandible directed distally; alternatively or additionally this enlarged avicularium may occur on the frontal wall, when the mandible is directed proximally. Ovicell prominent, almost perpendicular to frontal plane of zooid, oval, flattened frontally, with a short quadrate labellum above the aperture and an uncovered frontal area of entooecium.

Remarks

The incidence of the different types of avicularia varies, and the larger type may be more common than the small in some specimens. Both types are seen in Busk's original specimen (BMNH 1887.12.9.653), which in other respects as well differs in no way from the *Meiring Naude* material.

Distribution

Brodiella longispinata was described by Busk (1884) from the Straits of Magellan and has been reported subsequently from New Zealand and the Chatham Islands (Uttley & Bullivant 1972). A synonymy of recent and fossil New Zealand records is given by these authors.

Brodiella ignota sp. nov.

Fig. 31C–D

Material

Holotype: SAM–A26454, station SM 250, 31°59,3′S 29°22,5′E, 150–200 m.

Description

Colony encrusting, multilaminar. Zooids oval to hexagonal, large and broad, convex, separated by distinct grooves. Primary orifice comprising an

orbicular anter, with finely denticulate rim, and a short, rounded poster below blunt condyles. Six or seven slender, distal oral spines; proximally, a thin peristomial rim encloses the orifice between the proximalmost pair of spines, particularly developed in heavily calcified older zooids. Frontal wall thick, vitreous and glistening, surface texture of densely packed rounded nodules; marginal pores few in number, small and inconspicuous, generally visible only in newly budded zooids. Avicularia paired, situated lateral to distal half of orifice; cystid small, tumid, rostrum elliptical, directed laterally or medially, mandible semicircular. Either or both avicularia frequently replaced by an enlarged type with an elongate spatulate mandible directed distomedially, close to distal border of orifice, reminiscent of *Hippaliosina*; palate with a small foramen almost occluded by a thick columella. Rarely, one or both types of avicularia may occur on the frontal wall. Small basal pore chambers present. Ovicells not found.

Etymology

Ignotus (L.)—unknown.

Remarks

The dimorphic avicularia, arising close to the primary orifice, the denticulate anter, the peristomial rim and the characteristically thick, nodular and vitreous frontal wall are all features of *Brodiella*, exemplified in the type species *B. longispinata* (above). *B. ignota* differs from that species in the proportions of the orifice, the shape and orientation of the enlarged avicularia and in possessing more slender oral spines. D. P. Gordon (1979 *in litt.*) has pointed out that the northern hemisphere species *Lepralia armata* Hincks (Hayward & Ryland 1979: 206, as *Buffonellaria*) also belongs to *Brodiella*.

Measurements (means of 20 values) in mm

Lz	lz
0,83	0,61

Family **Celleporidae** Busk, 1852

Celleporidae Busk, 1852: 85. Hayward & Ryland, 1979: 274.

Turbicellepora Ryland, 1963

Turbicellepora Ryland, 1963: 34. Hayward & Ryland, 1979: 284.

Turbicellepora conica (Busk, 1884)

Fig. 31E–F

Cellepora conica Busk, 1884: 203, pl. 28 (fig. 10), pl. 36 (fig. 1).

Material

Stations SM 163, SM 163/164, SM 164, SM 179, SM 180, SM 184, SM 185.

Description

Colony forming small nodules on erect substrata, pisiform, or branching in one or more planes to give a stellate appearance. Zooids closely packed, individual boundaries scarcely discernible. Primary orifice longer than broad; anter suborbicular, poster deep, V-shaped, constituting one-third of total orifice length. Peristome thin, tubular, incorporating proximolaterally a short cylindrical avicularium; mandible semi-elliptical or subtriangular, acute to frontal plane, directed obliquely laterally. Ovicell prominent, thinly calcified, frontal surface closely punctured by numerous small round pores. Vicarious avicularia of two types: elongate, broadly elliptical or slightly spatulate, with thin cross-bar and large palatal foramen, small (0,2 mm long) and generally infrequent; outnumbered by small vicarious avicularia, identical to suboral type, with semi-elliptical mandible.

Remarks

The peristome tends to encircle the orifice completely, extending on to the lateral regions of the ovicell. On older zooids the small avicularia tend to multiply and typically become clustered around the rim of the deeply immersed peristome, four or five commonly occur together. However, this very characteristic feature seems to be present only in colonies in which growth by frontal budding has slowed, in young colonies the continued budding of zooids results in a surface composed of numerous cylindrical peristomes. The multiplication of these small avicularia is thus apparently an ontogenetic, and possibly gerontic, effect.

Turbicellepora conica is known only from Simon's Bay, South Africa (BMNH 1899.7.1.482, 483, 484, 486).

Measurements (means of 20 values) in mm

Lor	lor
0,14	0,11

Turbicellepora valligera sp. nov.

Fig. 31G–H

Material

Holotype: SAM–A26455, station SM 163, 33°04,6′S 28°06,6′E, 90 m.
Other material: station SM 239.

Description

Colony developing from an encrusting base, forming a slender, erect cylindrical growth. Zooids distinct, strongly convex and thickly calcified; frontal wall fine-grained and smooth, with three or four very large marginal pores. Primary orifice longer than broad, with a deep V-shaped poster comprising

about one-third of the total length; hooded distally by a thin, erect peristomial rim, the free edge of which is often peaked medially or produced into two or more processes. Paired lateral oral avicularia; slender, cylindrical, with small semicircular mandibles, linked distally by the peristome. Proximal to orifice a conspicuous median umbo develops, often produced into an erect spike. Vicarious avicularia of two types: broadly spatulate, cross-bar slender with a thick median columella, palate with a small foramen; small, oval, with a semicircular mandible, often abundant.

Etymology

Vallum (L.)—a palisade, referring to the enveloping peristome.

Remarks

This species is superficially similar to *Osthimosia bicornis* (Busk) from which it differs in the position of the oral avicularia, which are proximolateral in *O. bicornis*. Further, the ovicell of *O. bicornis* has the single central pore characteristic of the genus; only a single partly immersed ovicell was found on the material of *T. valligera*, but it was typical of *Turbicellepora*, being closely punctured by small pores. The numerous small vicarious avicularia are also seen in *T. pustulata* (Busk), but this species is characterized by a single lateral oral avicularium, and the absence of the columella on the cross-bar of the spatulate avicularium.

Measurements (means of 20 values) in mm

Lor	lor
0,15	0,12

Celleporaria Lamouroux, 1821

Celleporaria Lamouroux, 1821: 43. Harmer, 1957: 663.

Celleporaria tridenticulata (Busk, 1881)

Fig. 19H

Cellepora tridenticulata Busk, 1881: 343, pl. 26 (fig. 9).
Celleporaria tridenticulata: Harmer, 1957: 670, pl. 42 (figs 5–10).

Material

Stations SM 162, SM 163, SM 163/164, SM 164.

Description

Colony encrusting, multilaminar, forming small nodules. Zooids oval, convex, separated by distinct grooves; boundaries distinct in peripheral zooids, later obscured. Primary orifice D-shaped, the straight proximal border with three or four short conspicuous denticles, each of which may be bifid

terminally. Peristome scarcely developed, forming at the most a low rim around the distal and lateral borders of the orifice; three or four short distal oral spines present. Adventitious avicularium median suboral, cystid frequently columnar; mandible short, semi-elliptical, typically directed transversely. Vicarious avicularia sparsely developed, mandible narrowly spatulate, or subtriangular. Ovicell prominent, oval, overarching much of the primary orifice; thinly calcified, with a wide triangular frontal orifice.

Remarks

Celleporaria tridenticulata has been widely reported in the Indo-West-Pacific region, from the Great Barrier Reef and New Guinea to Ceylon and Mauritius. This is the first record of its occurrence in South African waters.

Celleporaria capensis (O'Donoghue & De Watteville, 1935)

Fig. 15I–J

Holoporella capensis O'Donoghue & De Watteville, 1935: 203, pl. 5 (figs 9–10), pl. 6 (fig. 15).

Material

Stations SM 163, SM 163/164, SM 180, SM 185.

Description

Colony encrusting, developing multilaminar sheets and nodules. Zooids oval, convex, thinly calcified; frontal calcification finely granular, translucent, with a few inconspicuous marginal pores. Orifice large, subterminal, wider than long, almost semicircular, proximal border slightly concave; two short and thick, widely spaced, distal oral spines present in young zooids. Peristome, when developed, forming simply a thin raised proximal lip, occasionally overarching the orifice in older zooids; rarely, peaked medially to form a short columnar umbo. Adventitious avicularia proximolateral to orifice, mandible elongate, semi-elliptical, directed distally; one or two present in newly budded zooids, later proliferating. Vicarious avicularia sporadically developed, mandible elongate, semi-elliptical or slightly spatulate. No complete ovicells found.

Remarks

C. capensis is known only from South Africa. Described originally from Still Bay, southern Cape (O'Donoghue & De Watteville 1935), it was subsequently reported from St. James and Oudekraal, south-western Cape (O'Donoghue & De Watteville 1937), and from Port Elizabeth (O'Donoghue & De Watteville 1944).

Family **Vittaticellidae** Harmer, 1957

Vittaticellidae Harmer, 1957: 765. Wass & Yoo, 1975: 286.

Vittaticella sp.

Fig. 11D

Material

Station SM 185.

Description

Zooids slender, clavate; small, less than 0,4 mm long, including proximal node, daughter zooid of doubleton scarcely smaller than the mother zooid. Primary orifice D-shaped, proximal border gently concave, a distinct lip proximally. Frontal wall smooth, with scattered, minute, pores; vittae elongate, narrow, extending from a point well proximal to the orifice, to close to the proximal end of the zooid, each with a well-marked series of pores on each side. Scapular chambers developed as prominent paired avicularia, with short semicircular mandibles; usually symmetrical, except in daughter zooids in which the inner, axial, avicularium is not developed. Suprascapular and infrascapular chambers very small, closely united with avicularium and not conspicuous. Ovicell not observed.

Remarks

The material was scanty, comprising part of a single small colony, and insufficient for a more detailed morphological study. From its general features this species seems to belong to the same group of species as the Indo-West-Pacific *V. tenella* Harmer, *V. venusta* (MacGillivray), and *V. praetenuis* (MacGillivray) (Harmer 1957: 776; Wass & Yoo 1975: 295), and could not be readily identified with any species known from the South African region. However, the vittaticellid fauna of the western Indian Ocean is poorly known.

Family **Mamilloporidae** Canu & Bassler, 1927

Mamilloporidae Canu & Bassler, 1927: 9. Harmer, 1957: 887.

Anoteropora Canu & Bassler, 1927

Anoteropora Canu & Bassler, 1927: 10. Harmer, 1957: 888.

Anoteropora latirostris Silén, 1947

Anoteropora latirostris Silén, 1947: 58, Pl. 5 (figs 25–27), figs 49–50. Hayward & Cook, 1979: 103.

Material

Stations SM 163/164, SM 185.

Description

Colony lunulitiform, large (up to 16 mm diameter), attached to sandy sediments by numerous basal rhizoids with deep vertical walls; frontal shield

small, with an almost central orifice. Both autozooids and brooding zooids with a large lateral avicularium, with curved, acute mandible.

Remarks

Eight complete colonies and fragments of several others were collected. Two of the five colonies from station SM 185 were alive at the time of collection and have intact basal rhizoids.

Distribution

Indo-West-Pacific.

ORDER CYCLOSTOMATA

Fragments of numerous species of Cyclostomata were present in the bottom sediments of most of the stations reported upon here, and were especially abundant in those from SM 163/164 and SM 129. Many of the specimens were of dead and worn colonies, evidently transported, including species of *Hornera*, *Tubulipora*, and *?Tervia*. The free tubular parts of peristomes and the brooding gonozooids are absent or damaged in most specimens rendering identification difficult. Although at least 20 distinct colony growth forms may be recognized, only 16 taxa have been identified, often doubtfully, to genus or species level. More than 40 species of cyclostomata have been reported from the South African region by Busk (1867, 1875, 1886), O'Donoghue (1924), O'Donoghue & De Watteville (1935, 1944) and Brood (1976*b*). Of these only 9 species have been found in the present *Meiring Naude* collections, although 1 additional form, *Crisia* aff. *holdsworthii*, was listed by Hayward & Cook (1979: 116). One notable absentee is *Tennysonia stellata* Busk (1867: 242, pl. 36 (figs 10–11)), which was first reported from South Africa, and has large, robust colonies. Another South African species, *Disporella buski* Harmer (1915: 161, pl. 12 (figs 4–5)), is known to have a wide distribution but is also absent from the present collections.

Generally, nominal species, at least, have very wide distributions and some species have been identified, both here and by Brood (1976*b*), with forms reported from the Philippines by Canu & Bassler (1929), from Indonesia by Harmer (1915), and from Australia by MacGillivray (1885). Examination of the type suites of some species, for example those described by Busk (1875, 1886) in the British Museum Catalogue and the *Challenger* Report respectively, has revealed, however, a wide range of variation within populations of nominal species. Some of these variants may even prove to be specifically distinct. It is obvious that revision of the South African cyclostome fauna will require detailed analysis of well-preserved, preferably living, colonies. Harmelin (1976*b*) has demonstrated that within the Mediterranean Tubuliporina many colony forms, and even zooid morphologies, are radically modified by environmental influences, and that convergence of character states can occur

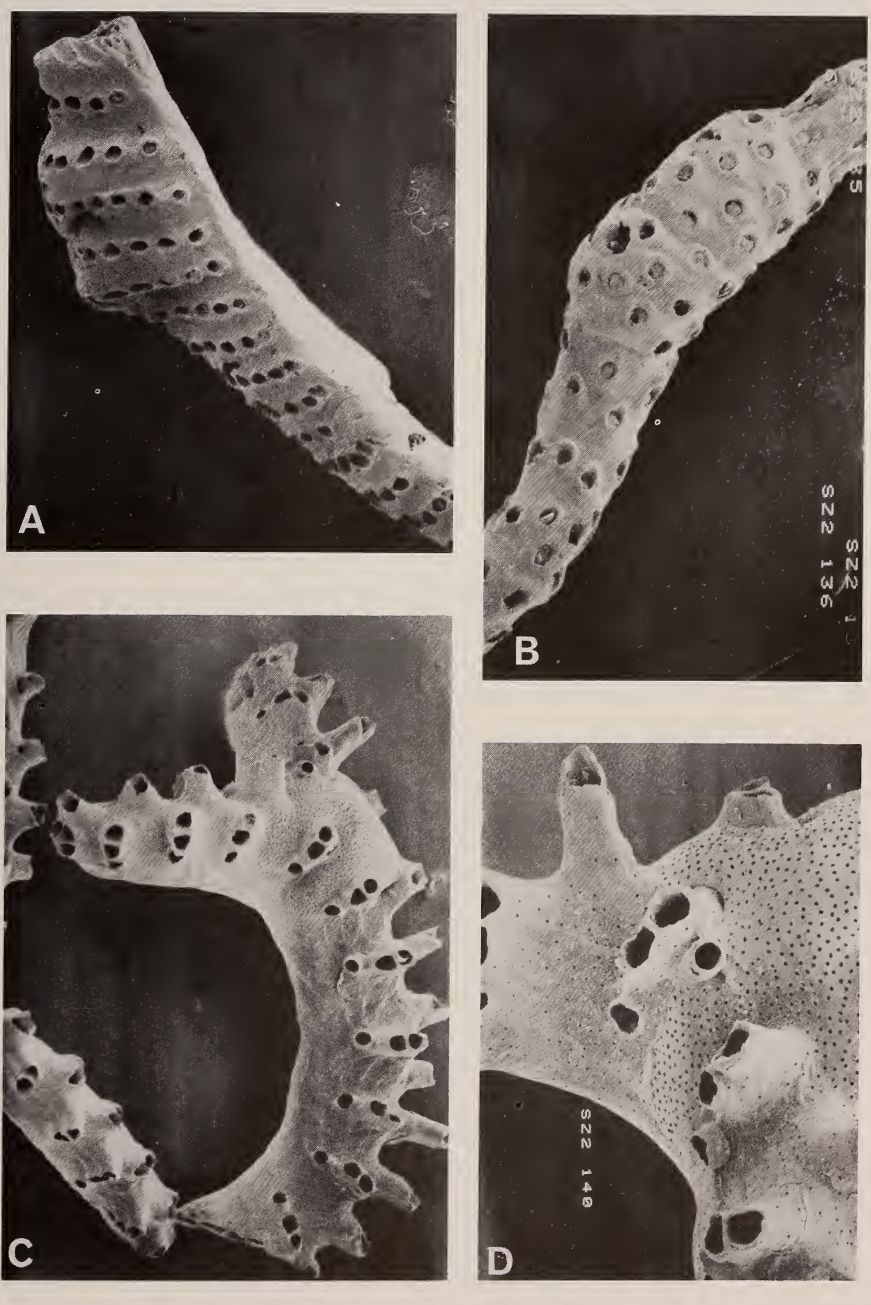

Fig. 32. A. *Idmidronea contorta* (Busk). × 16. B. *Mecynoecia clavaeformis* (Busk). × 17. C–D. *Idmidronea crassimargo* (Canu & Bassler). C. Two fragments of a colony, including a gonoecium. × 26,3. D. Detail to show ooeciostome. × 62.

among systematically unrelated species. Until such a detailed study may be made, it is pointless to attempt to revise specific and generic concepts, or to assign very worn fragments to previously described species. In assigning the present material to particular species it is not implied that the specimens have been compared with type material, unless so stated; rather, it is considered that the *Meiring Naude* fragments closely resemble the specimens illustrated by the authors listed in the synonymies.

Family **Diaperoeciidae** Canu, 1918

Diaperoeciidae Canu, 1918: 329.

Diaperoecia Canu, 1918

Diaperoecia Canu, 1918: 329. Harmelin, 1976*b*: 78.

Diaperoecia sp.

Material

Station SM 163.

Remarks

A single colony, lacking gonozooids, was found encrusting a worn, erect cheilostome bryozoan.

Family **Entalophoridae** Reuss, 1869

Entalophoridae Reuss, 1869: 285.

Mecynoecia Canu, 1918

Mecynoecia Canu, 1918: 326. Harmelin, 1976*b*: 160.

The characters of the genera *Pustulopora* and *Mecynoecia* have been discussed by Brood (1976*a*, 1976*b*) and Harmelin (1976*b*).

Mecynoecia clavaeformis (Busk, 1875)

Fig. 32B

Pustulopora clavaeformis Busk, 1875: 22, pl. 14 (figs 1–4).

Material

Stations SM 131, SM 163/164.

Description

Colonies club-shaped, up to 20 mm high, arising from a small, encrusting base. Zooids in irregular closely spaced whorls of three to six.

Remarks

Although somewhat worn, the fragments agree exactly with the material from Algoa Bay (BMNH 1875.5.29.34, 1899.7.1.530) described by Busk (1875).

Busk's specimens were also fragmentary and provide little information as to the later growth form of the colony and the systematic relationships of the species.

Mecynoecia delicatula (Busk, 1875)

Pustulopora delicatula Busk, 1875: 21, pl. 6B (fig. 3). Brood, 1976*b*: 290, fig. 13E–F.
Mecynoecia delicatula: Harmelin, 1976*b*: 160, pl. 27 (figs 1–8).

Material

Stations SM 129, SM 163/164, SM 185.

Description

Colonies erect, occasionally branched, with long zooids opening irregularly on all sides. Free peristomes long and curved. Gonozooids often at bifurcations, simple.

Remarks

Most specimens were slightly worn, and lacked the long peristomes. Brood (1976*b*) noted that this species was common from 50 to 700 m in east African waters.

Mecynoecia australis (Busk, 1852)

Pustulopora australis Busk, 1852: 350; 1875: 21, pl. 17A. Brood, 1976*b*: 291, fig. 13A.
Pustulopora proboscidea: Busk, 1886: 19, pl. 4 (fig. 2).

Material

Stations SM 129, SM 151, SM 163/164, SM 180, SM 185.

Description

Colonies similar to those of *M. delicatula* but with larger zooids and coarser calcification.

Remarks

Brood (1976*b*) reported *M. australis* as rare in east African waters, with a bathymetric range of 75 to 700 m.

Distribution

Indo-Pacific.

Family **Diastoporidae** Busk, 1859

Diastoporidae Busk, 1859: 91, 113. Harmelin, 1976*b*: 119.

Plagioecia Canu, 1918

Plagioecia Canu, 1918: 327. Harmelin, 1976*b*: 128.

Plagioecia patina (Lamarck, 1816)

Tubulipora patina Lamarck, 1816: 163.
Plagioecia patina: Harmelin, 1976*b*: 129, pl. 8 (figs 5–9), pl. 18 (figs 4–9), pl. 19 (figs 1–5).

Material

Station SM 163/164.

Description

Colonies forming flattened discs, often with an extended peripheral lamina and small subcolonies. Early budding fan-shaped, later zooids in repent, connate, single, radial rows. Gonozooids peripheral, transversely extended, ooeciostomes central.

Remarks

Two colonies were found, one of which was alive when collected.

Distribution

Temperate Atlantic, Mediterranean, and eastern Pacific.

Liripora MacGillivray, 1887

Liripora MacGillivray, 1887: 182.
Desmeplagioecia Canu & Bassler, 1920: 718. Brood, 1976*b*: 284.

MacGillivray (1887) introduced *Liripora* for two Recent Australian species, *L. lineata* (see below) and *L. fasciculata*, both of which had been originally assigned to *Diastopora* in an earlier paper (MacGillivray 1885). *L. fasciculata*, together with several fossil species included in the genus by MacGillivray (1895), is probably generically distinct from *L. lineata*. However, as the first species described in 1885 and the first listed in 1887, *L. lineata* may be regarded as the type species of *Liripora*, and Canu & Bassler (1920) seem to have introduced *Desmeplagioecia*, for *D. lineata*, unnecessarily. Canu (1908: 310) used the name *Liripora* incorrectly for flabellate species of *Tubulipora*.

Liripora is obviously closely related to *Plagioecia*, being distinguished principally by its multiple radial rows of connate zooids. The genus is also very similar to the fossil *Actinopora* d'Orbigny (see Brood 1976*b*: 284).

Liripora lineata (MacGillivray, 1885)

Diastopora lineata MacGillivray, 1885: 96, pl. 3.
Liripora lineata: MacGillivray, 1887: 182.
Berenicea lineata: Harmer, 1915: 116, pl. 11 (figs 6–7).
Desmeplagioecia lineata: Canu & Bassler, 1920: 718, fig. 234. Brood, 1976*b*: 284.

Material

Stations SM 163/164, SM 185.

Description

Colony encrusting, discoid, with a basal lamina; forming subcolonies by frontal extension. Primary zooids repent, budding distally and laterally. Later zooids radially disposed; peristomes connate, raised terminally, becoming

multizooidal. Areas between zooid rows calcified but not reticulate. Gonozooids peripheral and subperipheral, with distal ooeciostomes.

Remarks

Three young colonies, and a single group of four subcolonies were found; all were alive when collected. One further colony, on the concave side of a lamellibranch shell, had three gonozooids, and was dead. The subcolonies are formed by frontal extension of one or more peripheral zooids of the mother colony, which forms a new basal lamina. Some of the Australian colonies examined (BMNH 1897.5.1.1377, 1963.2.12.19.) are more robust than those from South Africa, but others are almost exactly the same in all characters.

A similar species, *Diastopora reticulata*, described from the Antarctic by Borg (1944: 68, pl. 4 (figs 3–8)), has reticulate interzooidal areas and a tubular ooeciostome.

Distribution

Indo-Pacific, including Japan and Australia.

Family **Tubuliporidae** Johnston, 1838

Tubuliporidae Johnston, 1838: 247. Harmelin, 1976*b*: 165.

Idmidronea Canu & Bassler, 1920

Idmidronea Canu & Bassler, 1920: 784. Harmelin, 1976*b*: 181. Buge, 1979: 232.

Harmelin (1976) discussed the character of *Idmidronea* and related genera, and noted the difficulties in distinguishing species, due to environmentally induced variation between populations of single species. Six different kinds of colony belonging to *Idmidronea* were distinguished in the *Meiring Naude* collections. Although these have been identified with known species, it should be noted that several of these were originally described from one or two fragments only, which may have represented parts of a single, variable species.

Idmidronea contorta (Busk, 1875)

Fig. 32A

Idmonea contorta Busk, 1875: 12, pl. 8. O'Donoghue, 1924: 24.
Tennysonia contorta: Canu & Bassler, 1922: 52, pl. 11 (figs 11–14); as *Lobosoecia semiclausa*, in error, on p. 145.

Material

Stations SM 129, SM 131, SM 163/164, SM 185.

Description

Branches short, inflated, curved; flat basally. Zooids connate, in alternating groups of six. Gonozooids occurring at bifurcations.

Remarks

The fragmentary specimens are closely similar to those from Algoa Bay described by Busk (BMNH 1875.5.29.18). The gonozooid has not been described before, but the specimens are worn and the ooeciostome is not obvious. *I. contorta* was recorded by O'Donoghue (1924) from several South African localities, from depths of 55–169 m. Harmelin (1976*b*) noted that Mediterranean records of this species are referable to *Tubulipora notomale* Busk (1875), which has much larger zooids.

Idmidronea crassimargo (Canu & Bassler, 1929)

Fig. 32C–D

Idmonea crassimargo Canu & Bassler, 1929: 545, pl. 85 (figs 2–3).
Idmidronea crassimargo: Brood, 1976*b*: 290, fig. 5I–J, M.

Material

Stations SM 163/164, SM 185.

Description

Colonies with basal side of branches curved, zooids in alternating, connate groups of three. Gonozooid short, inflated, frequently placed at a bifurcation; ooeciostome small, rounded with a short tube, central or lateral.

Remarks

Originally described from the Philippine Islands, from 320 m, this species was also recorded from several east African localities by Brood (1976*b*) between 60–150 m. Several of the *Meiring Naude* specimens were alive when collected; the gonozooids have not been figured before.

Idmidronea cf. *parvula* (Canu & Bassler, 1929)

Fig. 33A

Idmonea parvula Canu & Bassler, 1929: 546, pl. 85 (fig. 1).

Material

Stations SM 163/164, SM 185.

Description

Branches with flat basal side. Zooids in alternating connate groups of two or three.

Remarks

Several fragments of this small species were found, two of which had incomplete zigzag gonozooids. The zooids are distinctly smaller than those of *I. crassimargo*, and larger than those of *I.* cf. *biporata* (below). The gonozooids

Fig. 33. A. *Idmidronea* c.f. *parvula* (Canu & Bassler). × 24. B–D. *Hornera erugata* sp. nov. B. Frontal view of a branch, including a gonoecium. × 26,7. C. Detail to show ooeciostome. × 50. D. Basal view of colony and gonoecium. × 17,8.

are not inflated like those of *I. biporata*, but it is possible that all of these small forms, including *I.* cf. *antarctica* (below) are either very closely related systematically, or represent ecologically varying populations of the same species.

Idmidronea cf. *biporata* Brood, 1976

Idmidronea biporata Brood, 1976*b*: 290, fig. 5F–H.

Material

Stations SM 163/164, SM 185.

Description

Zooids very small, in alternating pairs, gonozooids inflated.

Remarks

Only three fragments were found. the zooids are minute, even smaller than those figured by Brood (1976*b*).

Idmidronea cf. *antarctica* Borg, 1944

Idmidronea antarctica Borg, 1944: 84, pl. 6, (fig. 4), pl. 7 (figs 1–2).

Material

Stations SM 129, SM 131, SM 163/164.

Description

Branches flat basally; zooids in closely spaced, alternating, connate groups of five. Gonozooids forming a zigzag ridge frontally.

Remarks

Only four minute fragments were found. The zooids are smaller than those figured by Borg (1944), but the gonozooid closely resembles that of *I. antarctica*, which also has five zooids in each group.

Idmidronea cf. *atlantica* (Forbes in Johnston, 1847)

Idmonea atlantica Forbes in Johnston, 1847: 278.
Idmidronea atlantica: Harmelin, 1976*b*: 182, pl. 32 (figs 1–11). Hayward & Cook, 1979: 116. Buge, 1979: 232, pl. 7 (fig. 4).

Material

Stations SM 129, SM 163/164.

Remarks

Numerous worn fragments were found, none of which had complete gonozooids. They are provisionally assigned to this widely distributed and very variable species.

Family **Crisiidae** Johnston, 1847

Crisiidae Johnston, 1847: 282.

Crisia Lamouroux, 1812

Crisia Lamouroux, 1812: 183. Ryland, 1967: 272.

Crisia elongata Milne Edwards, 1838

Crisia elongata Milne Edwards, 1838: 203, 235, pl. 7 (fig. 2). Busk, 1875: 5, pl. 4 (figs 5–6). Harmer, 1915: 103, pl. 8 (figs 13–17). Brood, 1976*b*: 282, fig. 4F, J, N.

Material

Stations SM 123, SM 163/164.

Description

Colonies with elongated, almost straight internodes, consisting of ten to twenty alternating zooids. Peristomes curved forward, short. Basis rami short, wedged in between two zooids, branches usually occurring high in an internode. Gonozooid dilated distally, ooeciostome slit-like, without a raised rim. Joints black.

Remarks

The material comprised numerous well-developed living colonies with extensive kenozooidal rooting systems. The joints are dark yellow early in ontogeny, rapidly becoming black. No gonozooids were present. The colonies are slightly less robust than Busk's colonies from Algoa Bay (BMNH 1875.5.29.5), but are closely similar to Brood's (1976*b*) figures of east African material. *C. elongata* differs from *C. transversata* Brood (1976*b*: 282, fig. 4E, G–I), which also has black joints, in having shorter zooids, longer and straighter internodes, less prominent peristomes and a longer gonozooid. *C. holdsworthii* Busk, which was reported from the earlier *Meiring Naude* collections, has much longer, more delicate zooids, and relatively colourless joints.

Distribution

Indo-Pacific, including Japan and Australia.

Family ***Lichenoporidae*** Smitt, 1866

Lichenoporidae Smitt, 1866: 404, 474.

Lichenopora Defrance, 1823

Lichenopora Defrance, 1823: 257.

Lichenopora novae-zealandiae (Busk, 1875)

Discoporella novae-zealandiae Busk, 1875: 32, pl. 30 (fig. 2).
Lichenopora novae-zealandiae: Harmer, 1915: 155, pl. 12 (figs 6–11). Brood, 1976*b*: 299, fig. 17H–I.

Material

Stations SM 131, SM 163/164, SM 184, SM 185.

Description

Colonies discoidal, raised centrally, with almost vertical sides. Zooids in radial, connate rows, the ends of the peristomes not free. Gonozooids central, surrounded by extrazooidal calcification; ooeciostomes large, rounded.

Remarks

Sixteen colonies were found, five of which were alive when collected. *L. novae-zealandiae* differs from *Disporella buski* Harmer, originally described (as *D. ciliata* Busk, 1875) from the Cape of Good Hope, in its regularly radial, connate zooid series, which are not free terminally (see Brood 1976*b*: 299, fig. 17D–G; Buge 1979: 242, pl. 9 (fig. 1)).

Distribution

Indo-Pacific, including Japan, Australia and New Zealand.

Family **Crisinidae** d'Orbigny, 1853

Crisinidae d'Orbigny, 1853: 902. Borg, 1941: 35.

Crisina d'Orbigny, 1850

Crisina d'Orbigny, 1850: 265; 1853: 912. Borg, 1941: 2.

Crisina radians (Lamarck, 1816)

Retepora radians Lamarck, 1816: 183.
Crisina watersi Borg, 1941: 16, pl. 2 (figs 3–4), pls 3–4.
Crisina radians: Brood, 1976*b*: 297, fig. 15H–J.

Material

Station SM 131.

Description

Colonies profusely and regularly branched in one plane; basal surface of branches flat, composed of kenozooids. Zooids in alternating connate groups of three to four.

Remarks

Two bifurcating fragments were found, one of which bore a gonozooid. Brood (1976*b*) considered that the east African material described as *C. watersi* by Borg (1941) was within the range of variability displayed by *C. radians*.

Distribution

Crisina radians is widely distributed in the Indo-West-Pacific region, from east Africa to Australasia, and also in New Zealand waters.

Family **Horneridae** Smitt, 1866

Horneridae Smitt, 1866: 404, 465. Gregory, 1899: 360. Borg, 1926: 385.

Hornera Lamouroux, 1821

Hornera Lamouroux, 1821: 41. Harmer, 1915: 147. Borg, 1926: 204, 385.

Hornera erugata sp. nov.

Fig. 33B–D

Hornera sp. Cook, 1968: 238.

Material

Holotype: BMNH 1842.11.30.45, Cape of Good Hope.
Paratypes: SAM–A26456, as above, Cape of Good Hope.
Other material: station SM 163.

Description

Colony erect, branching; branches curved in more than one plane. Zooids in laterally contiguous series of three to seven; peristomes long, often bifurcate in lateral zooids. Secondary branches formed by fascicles of three to four zooids. Basal extrazooidal calcification smooth, without obvious pores. Gonozooid basal, surface smooth; ooeciostome large, slit-like, lateral, closely opposed to the side of the branch, without a raised rim.

Etymology

Erugatus (L.)—smooth, referring to the basal calcification.

Remarks

Of the numerous worn fragments of *Hornera* present in the *Meiring Naude* bottom samples (p. 142), only three, relatively unworn, had the smooth basal calcification of *H. erugata*. The basal calcification of other species of *Hornera* is invariably corrugated, with large pores, pits and intervening ridges. The lack of corrugations on the gonozooid of this species is also unusual, as is the absence of a rim to the ooeciostome.

A somewhat similar species, which has ridged, porous basal calcification and a reticulate gonozooid with a raised, lateral ooeciostome, was described from the Antarctic as *H. smitti* by Borg (1944: 199, pl. 15 (figs 2–8)). *Pseudidmonea gracilis* Androsova (1965: 80, fig. 18), another Antarctic species, has a gonozooid somewhat like that of *H. erugata*, but a more delicate colony, with alternating series of three to five connate zooids.

Measurements (range of 10 values) in mm

Lz	Lg	lg	Loo.st.
0,4–0,5	2,5–3,0	2,0–2,5	0,4–0,55

DISCUSSION

General review of collection

The particular importance of the material described in the preceding account derives from the fact that it was collected from a range of depths for the most part far shallower than those from which the first series (1975–6) of *Meiring Naude* samples was taken. The bryozoan collections from the first two cruises originated from stations further to the north and east than those of subsequent cruises, and could be characterized largely as typical continental slope assemblages (Hayward & Cook 1979). The present collections are from a number of stations established off-shore between Durban and East London, the majority of which were located on the continental shelf of this region. Thus, 9 of the samples reported upon here were collected from depths of less than 200 m, 6 range between 500 m and 700 m, and only 3, 1 of which (SM 103) represents a residue from the 1976 cruise, were obtained from depths in excess of 700 m. The greatest depth sampled for bryozoans in the later survey was station SM 151, at 900 m. By contrast, the greatest depth represented in the first series of samples (Hayward & Cook 1979) was 1 300 m, with the majority of the material originating from between 600 m and 1 000 m. It is not surprising, then, that the bryozoan faunas revealed in each case should differ markedly.

The first report described 51 species, 48 of which were cheilostomata; the number of anascan species was only a little smaller than the number of ascophora and included several which were considered to be particularly adapted to life on the fine, unconsolidated sediments of the continental slope, such as the small colonies of *Setosellina*, *Heliodoma* and *Inversiscaphos*. There were also representatives of cellularine genera, for example *Columnella*, *Notoplites*, and *Bugulella*, frequently associated with slope faunas. The ascophora, similarly, included a number of highly specialized species in the genera *Anoteropora*, *Batopora* and *Lacrimula*. The present collection offers an immediate contrast in both the total number of taxa recorded, 130, and in the increased proportion of ascophorans. There were almost twice as many ascophorans (Table 2) as anascans (Table 1), and these were predominantly encrusting forms, together with a significant proportion with erect, rigid colonies, most notably the species of *Adeonella*. The anascans included a range of encrusting species, and a number of cellularines, such as *Menipea*, typically associated with shallow water faunas. A further difference is seen in the substantial number (sixteen) of Cyclostomata identified in these samples; with two exceptions (Table 3) live specimens of cyclostome species were recorded only at stations with depths of less than 100 m.

Only twenty-two of the species described here had been reported in the first *Meiring Naude* collections. For the most part these comprised species which occurred only at stations deeper than 500 m (e.g. *Tessaradoma* spp.), or which were represented in the first collections by specimens from the shallowest

stations only (e.g. *Flustramorpha angusta*, *Reteporella dinotorhynchus*), or which appear to have very broad bathymetric distribution patterns (*Setosellina roulei*). Thus, the two collections complement each other most usefully, and together provide a representative survey of the shelf and slope faunas of eastern South Africa. The results of the *Meiring Naude* cruises, together with the accounts published in the century following the *Challenger* investigations, provide a sound base line for future research on the bryozoan fauna of this region.

Including the new species described here, more than 280 nominal forms of Bryozoa have been reported from South Africa. Descriptions of these may be found in Busk (1852, 1854, 1884), Marcus (1922), Harmer (1926, 1934, 1957), the papers of O'Donoghue and O'Donoghue & De Watteville (q.v.), and a very few other sources. A precise enumeration is not yet possible, largely through outstanding problems of synonymy. Many South African forms were originally assigned the names of European species and, while it has been possible to review the systematic status of some of these, others will perhaps never be recognized. O'Donoghue (1924), for example, noted that both *Cellaria fistulosa* (Linnaeus) and '*Lepralia*' *foliacea* (Ellis & Solander) had been reported from South Africa, yet in view of the known geographical distribution of these two species (Ryland & Hayward 1977; Hayward & Ryland 1979) this seems improbable, and there is no way of ascertaining to which species these names were applied. Despite such problems, some useful synonymizing has been achieved by previous authors. *Caberea boryi* (Audouin), listed by Busk (1852) from Algoa Bay, may now be recognized as *C. darwinii* Busk (O'Donoghue 1924), and all records of *Steginoporella magnilabris* (Busk) may be assigned to *S. buskii* Harmer (O'Donoghue 1957). Several names introduced for South African bryozoans have proved to be junior synonyms of previously described species; for example *Bicellariella capensis* O'Donoghue is *B. chuakensis* Waters (O'Donoghue 1957), and *Beania paucispinosa* O'Donoghue & De Watteville is *B. vanhoffeni* Kluge (O'Donoghue 1957).

Research on the *Meiring Naude* samples has allowed some opportunity for revision and reassessment of previously known species. For example, Hasenbank's (1932) record of *Beania erecta* Waters is here redescribed as *B. rediviva* sp. nov. However, although it is clear that much similar revisionary work remains to be done, only 51 of the species described in this report have been described before from South African waters; with the exception of *B. rediviva*, the rest are either new species or newly reported for the region. For the slope fauna (Hayward & Cook 1979) 44 out of a total of 51 species belonged to these latter two categories. Thus, the bryozoan fauna of both the shelf and slope of eastern South Africa has a far greater diversity than was hitherto suspected and it is probable, from evidence discussed below, that its complete diversity is as yet uncharted. The fauna now known has a taxonomic diversity comparable to those of other, more widely studied, areas of continental shelf seas. For example, Cook (1983*b*) has listed 222 species from the shelf waters of west

Africa, and the cheilostome fauna of the British sea area (Ryland & Hayward 1977; Hayward & Ryland 1979) totals 186 species. The *Meiring Naude* investigations revealed a very high proportion of formerly undescribed cheilostomata which, together with the considerable numbers of apparently rare species also collected, suggests that the eastern South African fauna includes a substantial endemic element. It is likely that further surveys, with a coverage as intense as that accomplished by Millard (1975, 1978) for the hydroids, encompassing the whole of southern Africa will greatly enhance the presently known diversity of bryozoan species.

Analysis of bottom deposits

Two immediate impressions are gained from initial examination of the abundant sediment samples collected from a number of the *Meiring Naude* stations. Firstly, there is an almost complete absence of the minute 'sand fauna' species discussed in the previous report (Hayward & Cook 1979); secondly, a high proportion of the sediment at some stations consists of bryozoan skeletal remains.

The reasons for the virtual absence of such genera as *Batopora*, *Lacrimula* and *Heliodoma*, which were so abundant in the samples from stations SM 16–SM 109 (see Hayward & Cook 1979) are not obvious, and do not appear to be related directly to depth. These specialized forms were found in the first series of samples from depths of 376 to 1 300 m. Samples from similar depths were included in the present collections, yet *H. implicata* was frequent only in the residue of station SM 103, and none of the ascophoran genera, with the exception of *Anoteropora*, were found. The range of sediment particle size seemed essentially very similar in both series of samples, and although, as stated above, the stations of the 1977–9 surveys were situated further south than those of the 1975–6 cruises, other environmental parameters, such as bottom temperature, appear to have the same range with depth in both collections (Louw 1977, 1980).

An analysis of sediment types for ten stations for which samples were available is given in Table 4. The data comprise the approximate proportions of different constituents in a single sample for each station, graded in three coarse size fractions. The number of bryozoan species identified is given for each station including the number present as dead material only. There is considerable variation in sediment size between stations; for example, for SM 184 40 per cent of the sample was retained by the 5 mm sieve, while nothing passed the 1 mm sieve, whereas for SM 185 48 per cent of the sample passed the 1 mm sieve and nothing was retained by the 5 mm sieve. Inspection of the table reveals no apparent correlation between bryozoan diversity and sediment size.

The proportion of biogenic sediments in each size fraction also varies widely from station to station and again suggests no correlation with bryozoan diversity. Shell fragments constituted from 10 to 50 per cent of each sample,

often in the two smaller size fractions; these were largely finely comminuted molluscan shell, although remains of echinoderm test were frequent, and the coarsest fragments often included a significant proportion of decapod shell. The most interesting feature of this table is the significant contribution to the sediment made by bryozoan skeletal remains at several stations, viz. SM 129, SM 131, SM 151, SM 163/164, SM 179. At SM 179, in particular, bryozoan remains comprised 50 per cent of the sample. Most of the fragments were of erect genera, such as the cheilostome *Flustramorpha*, *Adeonella* and *Sertella*, and the cyclostomes *Mecynoecia*, *Idmidronea* and *Hornera*. Three subsamples from station SM 163/164, each of 1 cm^3 volume when dried, were studied in greater detail; an average of 400 bryozoan fragments was found per sample, of which 25 per cent were cyclostomata and 75 per cent cheilostomata. The total sediment sample for this station was estimated to contain 18 000 bryozoan fragments; 56 species were recorded for this station, including 24 that were represented by dead fragments only. The high species diversity and abundance of bryozoans in this region is thus reflected in the constitution of the bottom deposits; similar results were found by Wass *et al.* (1970) in a study of the Southern Australian shelf and slope. However, Table 4 also emphasizes the problems encountered in attempting to describe patterns of geographical and bathymetric distribution, and the need to differentiate carefully between living and dead, or attached and loose, specimens in benthic samples. A number of the species described above were represented by dead material only, and their real distribution remains unknown. The proportion of species represented by dead specimens only increases with depth; the stations in Table 4 with a high content of bryozoan remains in the sediment range in depth from 80 m (SM 179) to 850 m (SM 129). It is likely that each includes a different proportion of transported material while none probably represents a true thanatocoenosis. The proportion of very worn material varied from station to station; for example, 30 per cent of the skeletal material from SM 163/164 was too abraded to be identified, and 70 per cent of that at SM 179 was similarly unidentifiable. While some specimens could not even be readily assigned to a family grouping, others could be recognized as species, or even genera, which were not otherwise recorded in these collections, but which could not be reliably characterized. For example, abraded internodes of a species of *Margaretta* were frequent in several of the sediment samples. The last three stations in Table 4 (SM 180, SM 184, SM 185) each had a high diversity of bryozoan species, including a significant proportion of dead material, yet bryozoan skeletal remains were negligible in, or absent from, the sediments from these stations. In these three cases the living material included several cellularine species and a substantial number of large erect species (*Adeonella*, *Gigantopora*) encrusted with numerous other cheilostomata. Although the removal of large dead fragments from these samples prior to analysis undoubtedly biases the results, the lack of finer skeletal remains and the predominance of erect branching species probably reflect

local hydrographic conditions which are not conducive to the accumulation of bryozoan deposits.

Colonies of *Dactylostega prima* and *Chaperia familiaris*, particularly from stations SM 162 and SM 180, were often frequent on the tests of large specimens of the rhizopod foraminiferan *Schizammina pinnata* (Pearcey). This foraminiferan is known only from the south-eastern coast of South Africa (between 57 and 228 m), where it is frequently, although sporadically, abundant. The family Schizamminidae was introduced by Nørvang (1961) for

TABLE 4

Analysis of sediment components (%) from ten *Meiring Naude* stations.
A = < 1 mm fraction; B = 1–5 mm fraction; C = > 5 mm fraction; T = terrigenous material; S = shell; FS = foraminiferans with sand accreted tests; FC = foraminiferans with calcareous tests; BR = bryozoan fragments.

Station	Depth m		T	S	FS	FC	BR	Bryozoan spp. Total	Bryozoan spp. Dead
SM 103	680	A	20	0	50	0	0	7	6
		B	5	10	10	0	2		
		C	3	0	0	0	0		
SM 123	690	A	10	0	0	10	0	2	0
		B	0	10	0	20	0		
		C	10	10	10	20	0		
SM 129	850	A	25	5	2	3	0	7	7
		B	5	10	10	0	10		
		C	10	5	5	0	10		
SM 131	780	A	10	20	1	1	5	22	21
		B	0	25	1	0	25		
		C	2	5	0	0	5		
SM 151	900	A	0	5	5	0	5	8	8
		B	0	20	10	0	15		
		C	0	10	10	0	20		
SM 163/164	90	A	15	0	0	5	0	67	24
		B	0	20	0	5	30		
		C	0	10	0	0	15		
SM 179	80	A	5	5	0	0	10	24	4
		B	5	5	0	0	10		
		C	15	15	0	0	30		
SM 180	80	A	25	20	5	0	0	27	21
		B	20	20	5	5	0		
		C	0	0	0	0	0		
SM 184	86	A	0	0	0	0	0	23	12
		B	25	30	5	0	0		
		C	15	20	5	0	0		
SM 185	90	A	20	25	3	0	2	55	15
		B	20	25	3	0	2		
		C	0	0	0	0	0		

two genera of large Foraminifera, *Schizammina* and *Jullienella*, some species of which may grow to 70 mm in height or diameter, and which have dark or reddish-brown, rigid tests composed of agglutinated sand grains. *S. pinnata* (Nørvang, 1961: 192, pl. 7 (figs 9–17)) is robust, elongated, and has regularly alternating, short, sympodial branches, which form a zigzag pattern. Another South African species, *Jullienella pearceyi* Nørvang (1961: 198, pl. 9 (figs 1–11, 14)), is smaller, more inflated and almost polygonal in shape. In west African waters the large fimbriated plates of *J. foetida* Schlumberger (Nørvang, 1961: 195, pl. 8 (figs 1–13)) form the major substratum in some areas for a diverse fauna of bryozoan species (Cook 1968, 1983*b*). The mode of life of the foraminiferans is not known, but they are frequently covered on both surfaces by encrusting bryozoan colonies. Worn and fragmented specimens often form a significant proportion of bottom sediments (Table 4).

Geographical distributions

In Table 5 known geographical ranges are given for seventy-three previously described species. Fifty-one of these have been reported before from South Africa. The twenty-two species here recorded for the first time include a number which appear to have generally broad geographical distribution patterns, such as *Parasmittina tropica*, *Escharina pesanseris*, *Trypostega venusta*, *Celleporaria tridenticulata* and *Crisina radians*. Several others, such as *Cribrilaria innominata* and *Cleidochasma porcellanum*, are known to be complex variable entities in which apparently very broad distributions may be simply artefacts of systematic uncertainty. However, at least half of these twenty-two species are characterized by less broad distributions suggestive of more interesting patterns. *Hippoporidra senegambiensis* has an otherwise rather limited distribution on the west African shelf; *Cupuladria multispinata*, *Setosellina roulei*, *Heliodoma implicata*, and perhaps *Cribrilaria venusta* (p. 43) appear to show similarly narrow distributions, but in total these species constitute a minority in the eastern South African fauna. *Caberea darwinii* and *Brodiella longispinata* seem to be more widely distributed, cold-temperate Southern Hemisphere species, probably at the extreme northern limit of their range in South African waters. This pattern is seen in another species, *Amphiblestrum inermis*, long known from South Africa. However, the arrangement of Table 5 emphasizes the accepted faunal similarity of eastern South Africa with the Indo-West-Pacific realm and, like the previously reported species, these new records are predominantly of species with distributions extending through part or whole of this realm. *Escharina waiparaensis*, formerly known only from New Zealand, and *Hippomenella avicularis*, described from a few stations in the western Pacific, represent particularly significant range extensions; the distribution of *Hippoporella spinigera* is established through the inclusion in its synonymy of *Mucronella serratilabris* O'Donoghue (1924). *Crassimarginatella marginalis* seems to have a narrow

TABLE 5

Geographical distributions of previously described species.

	Atlantic	West Africa	South Africa	East Africa	Indian Ocean	Malay Archi-pelago	West Pacific	East Pacific	New Zealand	Sub-antarctic	Antarctic
Carbasea mediocris			×								
Cupuladria multispinata	×	×	×								
Discoporella umbellata	×	×	×	×							
Setosellina roulei	×		×								
Heliodoma implicata	×		×								
Amphiblestrum inermis			×								×
Crassimarginatella marginalis					×						
Foveolaria imbricata			×								
Chaperia multifida	?		×								
Chaperia capensis			×								
Chaperia stephensoni			×								
Notocoryne cervicornis			×								
Steginoporella buskii	×	×	×	×	×	×	×				
Cellaria tectiformis			×								
Cellaria punctata			×	×	×	×	×				
Cellaria paradoxa			×								
Caberea darwinii	×								×	×	×
Eupaxia quadrata			×	×	×						
Menipea crispa			×	×							
Menipea triseriata			×								
Menipea ornata			×								
Menipea marionensis			×								
Bugulella australis			×				×				
Beania magellanica	×	×	×		×		×		×	×	
Bugula dentata		×	×		×	×	×				
Cribrilaria innominata	×						×				
Cribrilaria venusta	×	×									
Figularia philomela			×		×						
Escharoides contorta			×								
Pachycleithonia mutabilis					×	×	×				
Tropidozoum burrowsi			×		×						
Parasmittina tropica		×		×	×	×	×				
Porella capensis			×								
Arthropoma cecilii	×	×	×	×	×	×	×				
Arthropoma circinatum	×						×	×	×		
Escharina pesanseris	×	×		×	×	×	×				
Escharina waiparaensis									×		
Calyptotheca nivea			×								
Calyptotheca porelliformis			×								
Stomachetosella balani			×								
Cleidochasma porcellanum	×	×		×	×	×	×				
Cleidochasma protrusum			×	×	×	×	×				
Cleidochasma cribritheca			×								
Hippoporidra senegambiensis		×									
Hippoporella spinigera			×			×	×				
Hippomenella avicularis							×				
Flustramorpha flabellaris			×								
Flustramorpha marginata			×		×						
Flustramorpha angusta			×								
Trypostega venusta	×	×		×	×	×	×	×	×		
Gigantopora polymorpha			×								
Adeonella majuscula			×								
Adeonella cracens			×								
Tessaradoma bispiramina			×								
Tessaradoma circella			×								
Sertella lata			×								
Schizoretepora tessellata			×				×				
Reteporella dinotorhynchus			×								
Brodiella longispinata	×								×		
Turbicellepora conica			×								
Celleporaria tridenticulata					×	×	×	×	×		
Celleporaria capensis			×								
Anoteropora latirostris			×	×	×	×					
Mecynoecia clavaeformis			×								
Mecynoecia delicatula				×							
Mecynoecia australis				×							
Plagioecia patina	×	×						×			
Liripora lineata				×		×	×				
Idmidronea contorta			×								
Idmidronea crassimargo				×			×				
Crisia elongata			×	×	×	×	×				
Lichenopora novae-zealandiae				×	×	×	×	×	×		
Crisina radians				×	×	×	×		×		

distribution within the Indian Ocean and is of interest in being, apparently, the first Mauritian species to be reported from South Africa.

A notable feature of this essentially shallow shelf fauna is that of the fifty-one species reported before from this region, twenty-nine have not been recorded from anywhere else. If at least a similar proportion of the forty-four new species described prove to be limited to eastern South Africa, then the endemic component of this fauna will be considerable. Millard (1978) showed that the endemic component of the South African hydroid fauna achieves its highest levels in the region between Cape Agulhas and Durban, and that while the eastern and southern regions of the South African shelf have a hydroid fauna with a substantial proportion of Indo-West-Pacific species, the character of the southern fauna, centred on Agulhas Bank seems sufficiently distinctive to confirm Briggs's (1974) contention that a separate faunal province may be recognized in this region. Bryozoan species diversity is frequently related to the availability of substratum and might be expected to be high on the Agulhas Bank. The most southerly of the stations represented in the present collections (SM 184, SM 185) were located at the northern extremity of the Bank; by analogy with Millard's (1978) results it seems probable that the South African bryozoan fauna may prove to be even richer than the present report suggests, and even more distinctive than the hydroid fauna.

The most exciting aspect of the geographical distribution patterns of the South African bryozoan fauna is the increasing evidence of strong similarities with eastern Australian and northern New Zealand faunas, and indications that this link may be of considerable antiquity. Three examples are given in Table 4: *Bugulella australis* and *Schizoretepora tessellata* have been reported elsewhere only from South Australia; *Escharina waiparaensis* was originally described from Miocene (Brown 1952) and Pliocene (Brown 1954) deposits of New Zealand, and subsequently live specimens were reported (Powell 1967) from Three Kings Islands, northern New Zealand. The occurrence of this species in South African waters is thus of the greatest interest. The new species described here also include several with equally extraordinary time–space distributions. For example, *Dimorphocella moderna* appears to be the only Recent representative of a genus well known from Australian Tertiary deposits. The large live colony was collected from the same station that produced the abundant, also live, material of *Aspidostoma livida*. Few Recent species of *Aspidostoma* are known, and most of these are small encrusting forms with a habit quite unlike the massive foliose colonies of *A. livida*. However, *Aspidostoma* also seems to be an ancient genus; Brown (1952) described a number of species with erect colony forms from New Zealand Tertiary deposits, and other fossil species are known from Australia (Maplestone 1902, 1911). *Macropora* is another interesting case; the genus is widespread through the Tertiary deposits of Australia and New Zealand, and one species with a long fossil history survives today in New Zealand and has also been reported from the Philippines. Few nominal Recent forms have been described; these

require re-examination and it is possible that *M. africana* may be only the second Recent form of this ancient genus.

A number of authors have published valuable integrated studies of Tertiary to Recent bryozoan faunas (for example, Lagaaij & Cook 1973; Cook & Lagaaij 1976; David & Pouyet 1978) that demonstrate the importance of such research to bryozoan phylogeny and the contribution it may make to the broader field of marine zoogeography. Bryozoans are particularly useful subjects for zoogeographical research; with very short larval lifespans, and consequent poor dispersal ability, with high species diversity in most shelf seas, and in many Tertiary deposits, and with perhaps rapid rates of phylogenetic change through time, they offer great potential for detailed analysis. As Lagaaij & Cook (1973) reiterate, wide distributions observed in Recent seas are the legacy of past expansions and contractions. The evident richness of the eastern South African fauna and its apparently high level of endemism, the numerous systematic affinities with the fauna of the south-west Pacific (see, for example, p. 47), and the number of ancient genera and species found in the present collections demand further investigation. Whether these features of the South African fauna reflect relict elements, or are truly autochthonous, can only be decided by further study of Recent populations, in comparison with Tertiary fossil deposits and Quaternary sediments.

SUMMARY

A total of 130 species of Bryozoa have been identified from samples collected by the R.V. *Meiring Naude* between 1977 and 1979. The sampling stations ranged in depth from 80 m to 900 m, with the majority in depths of less than 100 m. Bryozoan diversity was highest in the samples from the shallowest stations; 44 new species are described, including a high proportion of encrusting cheilostomata. The fauna described is considered to be representative of a typical shallow shelf-sea assemblage, in marked contrast to the deeper slope fauna reported upon in the first publication on the *Meiring Naude* Bryozoa (Hayward & Cook 1979). Together with the earlier contributions on the South African Bryozoa, referred to in the text, these two reports now provide a sound introduction to the bryozoan fauna of this region. Although some taxonomic problems remain and the question of broader systematic relationships is further complicated in some cases by these results, the particular character of the eastern South African fauna is more clearly defined and shown to include a substantial and distinctive endemic element. Further surveys on the Agulhas Bank may be expected to yield results that will further enhance this distinctiveness. Bryozoan skeletal remains were important components of biogenic carbonate sands in some of the areas sampled, and the presence of abraded fragments of unrecognized species in these sands shows that the taxonomic diversity of this fauna is still to be fully recorded.

The discovery of species and genera with extensive time–space distributions, and in particular the apparent faunal similarity between this region and Tertiary fossil deposits of Australia and New Zealand, suggest interesting and fruitful possibilities for further research.

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ABBREVIATIONS

Lz	length of zooid
Lop	length of opesia
Lor	length of orifice
Lov	length of ovicell
Lg	length of gonozooid
Loo.st.	length of ooeciostome
L br.z.	length of brooding zooid
L br.or.	length of brooding orifice
Lav	length of avicularium
L ad.av.	length of adventitious avicularium
L int.av.	length of interzooidal avicularium
Lm	length of mandible
BMNH	British Museum (Natural History)
SAM	South African Museum

lz	width of zooid
lop	width of opesia
lor	width of orifice
lov	width of ovicell
lg	width of gonozooid
l br.z.	width of brooding zooid
l br.or.	width of brooding orifice
lm.	width of mandible

APPENDIX 1

MEIRING NAUDE STATIONS THAT PRODUCED BRYOZOA

Station	Co-ordinates °S	°E	Depth, m	Date
SM 103	28°31,7′	32°34′	680	24.5.76
SM 123	30°33,4′	30°48,6′	690	10.5.77
SM 129	30°53,4′	30°31,7′	850	11.5.77
SM 131	30°43,2′	30°40,8′	780	11.5.77
SM 151	30°14′	31°27,6′	900	17.5.77
SM 162	32°55′	28°31′	630	25.5.78
SM 163	33°04,6′	28°06,6′	90	26.5.78
SM 164	33°04,6′	28°06,6′	90	26.5.78
SM 179	33°30,3′	27°22,1′	80	29.5.78
SM 180	33°29,4′	27°21,2′	80	29.5.78
SM 184	33°39,4′	27°11,7′	86	31.5.78
SM 185	33°39,3′	27°11,6′	90	31.5.78
SM 232	32°14,9′	29°10,4′	560–620	25.6.79
SM 233	32°15,2′	29°09,8′	540–580	25.6.79
SM 234	32°15′	29°09,1′	500–520	25.6.79
SM 239	32°14,8′	29°00,8′	90	25.6.79
SM 250	31°59,3′	29°22,5′	150–200	27.6.79

APPENDIX 2

INDEX TO GENERA AND SPECIES

Correct names are given in italic; synonyms in roman.

(atlantica, Idmidronea overleaf)

(Crisina overleaf)

(Holoporella capensis *overleaf)*

(Odontionella cyclops overleaf)

(stomachosum, Rhynchozoon overleaf)